THE IRON TRADE REVIEW

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BEST RECORD

IN TEN YEARS MADE BY MANY PLANTS IN MAY.

Greatly Increased Activity With Bright Prospects—Rivets and Shafting Alone Show Price Cutting.

May was the best month in two years for many iron and steel industries, and the prospect for even greater activity is very favorable. It is estimated that the blast furnace and rolling mill capacity of the country is now being operated at about 80 per cent of the production of 1907, and that with the growing volume of railroad orders, the percentage will certainly increase. In the Chicago district, the leading interest booked orders for about 300,000 tons of steel for shipment before Oct. 1, and actual specifications considerably in excess of the capacity of the bar mills at Bay View were received. Current orders for plates and shapes exceed the capacity of the mills of the Illinois Steel Co., and similar reports come from Pittsburg and other manufacturing centers. Specifications received by one of the large independent concerns ran far ahead of the steel capacity of the company in both April and May, the latter month showing a large increase over the former, and specifications received by the rail and billet departments of the Carnegie Steel Co. in May showed a large increase compared with April. Careful investigation has demonstrated that there is very little speculation in all the buying that has taken place, and in the case of some manufacturers, stocks are the lowest in their history. The exceptions to the general rule of satisfactory conditions are furnished by rivets, on which competition is fierce and prices very low, and by shafting, on which competition is keen. Wage restorations in the Pittsburg and valley districts are general.

Structural Material

May bookings of structural material amounted to about 225,000 tons, of which 170,000 went to independent interests. Prices for plain material are firm, but there is still considerable irregularity in fabricating and erecting prices. The New England Structural Co. has taken the contract for the Boston & Albany grain elevators, South Boston, calling for 5,000 tons; James Stewart has received the contract for the Puget Sound Realty Co. building at Denver, 3,000 tons; and the contract for 3,000 tons for the Utah hotel, Salt Lake City, is reported as placed with the American Bridge Co. The steel for the Boston store in Chicago, 4,000 tons, will be fabricated by the South Halsted Steel & Iron Works, and will be held until the owners are ready to proceed with the erection. This order is significant, as showing a belief that prices will advance. Similar action may be taken in regard to a Chicago warehouse calling for 5,000 tons of steel.

Railroad Buying

Among the contracts awarded by railroads within a few days are the following: Pennsylvania Tunnel & Terminal Co., 2,300 tons to the McClintic-Marshall Construction Co., and 1,700 tons to Louis F. Shoemaker; Grand Trunk system, 700 tons to the Pennsylvania Steel Co. and 1,400 tons to the Wisconsin Bridge Co.; the Seaboard Air Line, 1,600 tons to the Pennsylvania Steel Co.; the Rock Island has also awarded 2,100 tons of bridge work. Recent car orders and inquiries may be summarized as follows: The Harriman lines have placed orders recently with the Pullman Co. for 1,500 refrigerator cars, and with the Baldwin Locomotive Works for about 100 locomotives; the Gould lines have bought 1,500 cars from the Pressed Steel Car Co., this including the Western Pacific order, and are in the market for 2,850 additional; the M., K. & T. has divided an order of between 500 and 700 cars among three companies; the Chesapeake & Ohio has bought 1,500 cars, 500 from the Pressed Steel and 1,000 from the Standard Steel Car companies; the Pennsylvania lines west have bought 47 passenger cars, and are in the market for 1,000 cars; the eastern system is in the market for 214 passenger cars; the Great Northern has bought 500 cars; the Northern Pacific is in the market for 1,000 cars; the Reading is in the market for 500 large steel gondolas; the Lehigh Valley has bought steel underframes for 1,500 cars and is in the market for 15 steel passenger cars; the Jersey Central has taken bids on 1,500 cars; the New York Central lines have ordered 3,000 cars from the American Car & Foundry Co. and will build 1,000 at East Rochester. The steel underframes required for this system this year are estimated at 12,000. The Long Island railroad is to buy 100 steel motor cars.

Pig Iron Is Firm

Pig iron is strong, but with the exception of continued sales of basic in eastern territory, sales have been neither large nor numerous. The outlook is for somewhat higher prices, but it is probable that the blowing in of new furnaces, as soon as prices advance somewhat, will check too high quotations. The test of the southern market will probably come about July 1, when many new contracts for last half delivery will be made.

THE WEEK IN IRON CENTERS

PITTSBURG.

June Opens With Fine Prospects—Speculative Buying Discouraged.

Office of THE IRON TRADE REVIEW,
510 Park Bldg., June 1.

Closing a month of exceptionally heavy tonnage in the aggregate of orders entered for immediate rolling, the iron and steel industry has moved into June with brightened prospects. The month of May saw the highest point up to the present time reached by the recent revival of buying vigor in the market. The total specifications in the different finished products received in that period were considerably in excess of those of the preceding month, and, in frequent cases, the new orders placed upon mill books were heavier than the shipments made. This condition has resulted in some falling behind with deliveries.

Efforts have been made by some companies to determine the speculative element that has entered into the recent buying movement which is a factor that is recognized as having an important bearing upon the maintenance of current activity. The result of such investigations has usually been favorable, as it has been ascertained that the material shipped is moving freely to ultimate consumption. At some consuming centers in steel bars, it was found that stocks in the hands of manufacturing patrons were on June 1, the lowest in history. A studied attempt to check and discourage speculative buying is being made by the mills in their refusal to sell material for extended deliveries and, with some interests, by requiring specifications to accompany orders at present prices. Generally it is believed that shipments to date have gone mainly into consumers' hands as evidence is lacking to show that jobbers have made any extensive or concerted efforts to replenish depleted stocks, although, in some lines, they are ordering moderately beyond the requirements of their going trade.

Blast furnace and finishing mill operations in the Pittsburg district continue to increase. The Carnegie Steel Co. in the past week started its No. 4 furnace at its Ohio works, giving it 44 active stacks out of 59. This is a numerical percentage of about 74, but from the standpoint of actual capacity is about 80 per cent of full output. Additional open-hearth furnaces were also put on at South Sharon. The company is now operating all its merchant mills with the exception of Greenville and all its steel works outside of Columbus and Sharon. The National Tube Co. has started the two blast furnaces at its Riverside plant and will resume with some of the tube mills in a few days, making the first activity in this works in 20 months.

Practically all the steel and blast furnace interests in the Pittsburg, Mahoning and Shenango valley districts which had reduced the wages of their workmen 10 per cent, restored the former schedules June 1.

Iron Ore.—The purchase of a block of 20,000 tons of silicious ore by a Southern Ohio furnace interest at a special price, is reported by Pittsburg sellers.

Pig Iron.—Further advances have been made in the pig iron market and there is general firmness in prevailing prices. Recent buying has been less in evidence, but considerable tonnage is being placed under contract for shipment at various periods over the year. The inquiry continues quite fair.

The Bessemer average for May was $14.94 valley or $15.84 Pittsburg compared with $14.90 valley or $15.80 Pittsburg, in April, and $15.44 valley, or $16.34 Pittsburg, in March. The basic average was $14.12 valley or $15.02 Pittsburg in May against $14.15 valley or $15.05 in April and $14.94 valley and $15.84 Pittsburg in March. The sales upon which these averages were computed were the heaviest in a number of months.

A local steel company is in the market for its requirements of basic for third quarter, amounting to about 10,000 tons. Sales of steel-making iron in the week include lots of 500 tons and 400 tons of basic for prompt shipment at $14.50 valley and 500 tons of Bessemer at $15.25 valley. A sale of 400 tons of low sulphur, chill cast Bessemer at $17 valley is reported. In foundry, a Pittsburg melter has closed for 600 tons of No. 2 and 600 tons of No. 3 for delivery over the remainder of the year at $15 and $14.50 valley, respectively.

The Rebecca furnace of the Kittanning Iron & Steel Mfg. Co. was blown out the past week.

A leading maker of southern iron reports sales of about 30,000 tons of foundry grades during the month of May. This interest is asking $11.50 Birmingham, for No. 2 for third quarter and $12 for fourth quarter.

On prompt and third quarter shipment on northern iron, we quote as follows:

Bessemer, valley	$15.00 to 15.25
Bessemer, Pittsburg	15.90 to 16.15
No. 2 foundry, Pittsburg	15.65 to 15.90
Gray forge, Pittsburg	14.65 to 14.90
Basic, valley	14.50 to 14.75
Basic, Pittsburg	15.40 to 15.65

Ferro-Alloys.—Quite an active buying of ferro-manganese has been carried on in this market recently, and consumers have covered for their needs for the future in lots ranging from 100 to 500 tons. Fifty per cent ferro-silicon for prompt shipment is very difficult to obtain owing to the small amount of material that is available from either domestic or foreign makers, and this market today is quoted at $70 Pittsburg. For future shipment, prices are lower. We quote 80 per cent ferro-manganese at $41 to $42 seaboard with a freight rate of $1.95 to Pittsburg.

Fifty per cent ferro-silicon is quoted at $63 to $65 Pittsburg on forward deliveries; domestic, 12 per cent, $26; 11 per cent, $25; 10 per cent, $24, Pittsburg.

Plates.—The Central New Jersey railroad has entered the market for 1,500 all-steel freight cars and this order is receiving the attention of car builders and steel makers. Specifications to the mills continue very heavy, coming from fabricating interests, steel car companies and miscellaneous sources, but tank steel is only moderately active. As a consequence, the mills have very good schedules. The 1.30c price is being shaded on desirable lots, and some pipe interests have closed on large tonnages at about 1.25c Pittsburg. The steel boat projects for lake and ocean service are still pending. We quote the present market as follows:

Tank plate, ¼-inch thick, 6¼ to 100 inches, 1.25c to 1.30c mill. Extras are as follows per 100 pounds. Boiler and flange steel plate, 0.10c; A. B. M. A. and ordinary firebox steel plates, 0.20c; still bottom steel, 0.30c; marine steel, 0.40c; locomotive firebox steel, 0.50c; all sketches, excepting straight taper plates varying not more than 4 inches in width at ends, narrowest end not being less than 30 inches, 0.10c; circles, 0.20c. Plates in widths over 100 inches up to 110 inches, 0.05c; over 110 inches up to 115 inches, 0.10c; over 115 inches up to 120 inches, 0.15c; over 120 inches up to 125 inches, 0.25c; over 125 inches up to 130 inches, 0.50c; over 130 inches, 1c. Gages under ½-inch to and including 3/16-inch

plate on thin edges, 0.10c; under 3/16 to and including No. 9, 0.25c. Five cents extra for less than carloads. Terms, net cash in 30 days.

Sheets.—A very favorable assortment of sheet specifications is being entered on mill books, and it is indicated that this tonnage is going freely into consumption, as, except in a few cases, there is no extensive ordering for stocks. The manufacturing trade is taking material very well. While there is some improvement in sheet prices, certain interests are still aggressive for business and shading is being done. This tendency appears more marked in iron sheets. The American Sheet & Tin Plate Co. has increased its operations by putting on additional mills at different plants, and is now running 117 mills, or 63 per cent of its total capacity, compared with 111 mills or 60 per cent a short time ago. We quote present minimum prices which are subject to some shading, as follows:

Blue annealed sheets, Nos. 10 and heavier, 1.60c; Nos. 11 and 12, 1.65c; Nos. 13 and 14, 1.70c; Nos. 15 and 16, 1.80c; box annealed sheets, Nos. 10 to 12, 1.85c; Nos. 13 and 14, 1.90c; Nos. 15 and 16, 1.95c; Nos. 17 to 21, 2c; Nos. 22 to 24, 2.05c; Nos. 25 and 26, 2.10c; No. 27, 2.15c; No. 28, 2.20c; No. 29, 2.25c; No. 30, 2.35c; galvanized sheets, Nos. 13 and 14, 2.30c; Nos. 15 and 16, 2.40c; Nos. 17 to 21, 2.50c; Nos. 22 to 24, 2.65c; Nos. 25 and 26, 2.85c; No. 27, 3.05c; No. 28, 3.25c; No. 29, 3.35c; No. 30, 3.60c; painted roofing sheets, $1.55 per square for No. 28 gage, 2½-inch corrugation, and galvanized roofing sheets, $2.80 per square for No. 28 gage, 2½-inch corrugation.

Tin Plate.—Liberal orders in tin plate are being received, much of which is intended for the present fruit and vegetable crops. Consumers are practically all under contract and are specifying according to their estimated needs. The leading interest continues to operate 202 mills, which represent all of its serviceable capacity, with the exception of the Demmler plant, which may be put in operation soon, although no official announcement to this effect is made. The independent mills of the country are running at from 80 to 90 per cent. Tin plate prices are regular and we quote the present market as follows:

Coke tin plate, 100-pound basis, 14 x 20, $3.45 f. o. b. mill Pittsburg district and $3.40 in large lots. Terms, 30 days, less 2 per cent for cash in 10 days.

Rails and Track Material.—While the western railroads have been the leaders in ordering rails, the buying movement appears to be trending eastward, and makers in this territory are better satisfied at prospects. Current new business for the local maker is usually in lots of 1,000 tons and less. Orders entered in May for the rail mills show a substantial increase over any other month in the past 18. This has been mainly due to the activity in light rail buying, which has been very brisk. The Carnegie Steel Co. last week booked over 2,800 tons of this product. Prices in this market are very firm at present and the re-rollers are not aggressive. On present specifications on Bessemer rails, we quote as follows, the base price for open-hearth rails being $30 mill:

Fifty-pound and heavier, 500-ton lots and over, $28; carloads and less than 500 tons, $30; less than carload lots, $32; light rails in lots up to 250 tons, 8-pound, $29; 12-pound, $28; 16 to 25-pound, $27; 30 to 35-pound, $26.75; 40 to 45-pound, $26; on lots over 250 tons, prices are 60c less, and over 500 tons, $1 less; angle splice bars for standard sections, 1.50c Pittsburg; standard spikes, 1.60c to 1.70c Pittsburg; hand spikes, 1.60c to 1.70c Pittsburg.

Steel. — Concessions on semi-finished material from the recognized level which have been made more or less freely during the past several months are disappearing, and prices are taking an upward turn. This is especially true in open-hearth billets, which are scarce on account of the greater finishing operations of the mills, and some sales have been made at better than $23 Pittsburg, while forging billets have brought as high as $27 Pittsburg. In sympathy with the situation in open-hearth steel, Bessemer billets are stronger. A favorable indication in this market is that some steel makers find their finishing demands such that they have been obliged to purchase material from other steel interests. Some concessions have been made in sheet bars, but these have usually applied to prompt material. Consumers are specifying heavily against contracts with the mills.

Bessemer and open-hearth 4 x 4 billets with 0.25 carbon and less are regularly quoted at $23 Pittsburg, with the usual extras for size and analysis, and forging billets at $25 to $27 Pittsburg. The regular quotation on sheet and tin bars is $25 Pittsburg, but prompt material has been sold and some contracts made at about $1 under this price. Steel makers divide with consumers the freight within the $1 limit, making the price in such territory $23.50 delivered on billets, and $25.50 delivered on sheet bars.

Hoops and Bands.—There is not much change in the hoop situation, although orders are in somewhat better volume. Some cases of price concessions below the recognized level are still to be noted. We quote the present regular market as follows:

Hoops in carload lots, 1.40c to 1.50c; in less than carload lots, 1.50c to 1.60c; bands, 1.20c, base half extras as per standard steel.

Merchant Bars.—Where investigation has been made by steel bar makers as to the ultimate disposition of the heavy tonnage moving to jobbers and manufacturers, it has been found that the material generally is going into final consumption. In some manufacturing centers, a canvass has shown that stocks among the manufacturing trade June 1 were the lowest in history. The May specifications in steel bars have been unusually heavy, and producers generally received orders in excess of shipments over this period, so that deliveries are now being retarded. In some cases, no material for delivery in less than six weeks is being accepted. Some of the makers who are quoting 1.25c Pittsburg are taking a little business at this figure, although they had elevated their quotations to practically withdraw from the market. The Carnegie Steel Co. is running all its regular bar mills with the exception of Greenville. Bar iron is stronger than 10 days ago and higher prices are being obtained at St. Louis and Chicago, which have been below the 1.30c base. The shafting market is unsatisfactory as considerable shading is being done. We quote the present market as follows:

Common iron bars, 1.30c to 1.35c Pittsburg; Bessemer and open-hearth steel bars, 1.20c to 1.25c; plow and cultivator, 1.20c to 1.25c; channels, angles, zees, tees, under 3-inch, 1.30c, all f. o. b. mill. The following differentials are maintained on steel: Less than 2,000 pounds, 0.10c advance; less than 1,000 pounds of a size, 0.30c advance. Cold rolled and ground shafting, 60 per cent in carloads, and 55 per cent in less than carloads, delivered in base territory. Planished and machine straightened tire is 1.40c base; iron finished tire under 1½ by 1½ inches, 1.35c, both plus ½ extra on tire card; iron finished tire, 1½ by ½ and over, 1.20c, plus ½ extra on the steel bar card.

On cold rolled strip steel, width 1½ inches and wider, and 0.100 inch and

thicker, we quote base prices for 100 pounds, $3.05 on hard, and $3.30 on soft.

Structural Material.—The American Bridge Co. during May booked 54,000 tons of structural material, which is very close to its normal output. There is a good steady inquiry in commercial undertakings, although the railroads are not so active in this respect as they have been. Fabricating interests which have been prominent in taking business at low prices are still quite active, and the fabricating situation in this respect has shown no marked improvement. Bids went in the past week for a public bridge at Franklin, Pa., which will require 400 tons. The McClintic-Marshall Construction Co. is the low bidder at $73,450, but a concrete structure may be erected. We quote the present market on structural shapes as follows:

Beams and channels, 15-inch and under, 1.25c to 1.30c; over 15 inches, 1.35c to 1.40c; zees, 1.25c to 1.30c; tees, 1.30c to 1.35c; angles, from 3 to 6 inches, 1.25c to 1.30c; over 6 inches, 1.35c to 1.40c; universal and sheared plates, 6¼ inches wide and wider, 1.25c to 1.30c.

Merchant Pipe.—The National Tube Co. during the past week fired its two blast furnaces at its Riverside works, which is the first activity at this plant in 20 months. Some of the pipe furnaces are to be started in the course of a few days. From the standpoint of current consumption, the market appears to be in a favorable position, as the jobbers are ordering only slightly in excess of their going trade. Shipments and orders during May were very heavy, and some mills have sold up their June output, so that they are now entering specifications for July. In anticipation of better prices, the mills are not willing to take extended future business. The expectation of an advance effective June 1, however, was not fulfilled. Some of the oil and gas line projects before the market are still progressing, although the season for such contracts is passing. The large Ohio Fuel Supply Co. order, the closing of which was stated last week, will be furnished by different mills. Merchant pipe prices are firm, but concessions are being made by some interests on line pipe and oil and gas country goods. We quote the following official discounts on merchant pipe subject to an additional one point and five off to jobbers:

	—Steel—		—Iron—	
	Black.	Galv.	Black.	Galv.
⅛ and ¼ inch.....	72	56	69	..
⅜ inch	73	59	70	56
½ inch	76	64	73	61
¾ to 6 inch.....	80	70	77	67
7 to 12 inch.....	75	60	72	57
PLUGGED AND REAMED.				
1 to 4 inch.....	78	68	75	65
EXTRA STRONG PLAIN ENDS.				
⅛ to ⅜ inch.....	65	53	62	50
½ to 4 inch.....	72	60	59	57
4½ to 8 inch.....	68	56	65	53
DOUBLE EXTRA STRONG PLAIN ENDS.				
½ to 8 inch.....	61	50	58	47

Boiler Tubes.—The capacities of some of the smaller makers of boiler tubes are well engaged by reason of a fair volume of business for them having been closed. The larger plants, however, are not especially active. Some shading is being done in tube prices. We quote the following official discounts on lap-welded steel boiler tubes to jobbers in carloads:

1 to 1½ inch.....	50
1¾ to 2¼ inch.....	62
2½ inch	64
2¾ to 5 inch.....	70
6 to 13 inch	62

2½ inch and smaller, over 18 feet, 10 per cent net extra.
2¾ inch and larger, over 22 feet, 10 per cent net extra.
To destinations east of the Mississippi river will be sold at delivered discount for carloads lowered by two points, for lengths 22 feet and under; longer lenghts, f. o. b. Pittsburg.

We quote the following official discounts on charcoal iron tubes to jobbers:

1 to 1½ inch.....	45
1¾ to 2¼ inch.....	45
2½ inch	50
2¾ to 5 inch.....	45
6 to 13 inch.....	45

Wire Products.—Not much tonnage in wire products has accumulated on mill books since the recent advance in prices, as business has usually not been accepted unless specifications for quick delivery have accompanied orders. The general disposition among wire producers is not to commit themselves beyond July or August except at advanced prices, as there is a current anticipation of higher official schedules in the near future. We quote the present market on wire products as follows:

Wire nails, jobbers' carload lots, $1.70; retailers' carload lots, $1.75; painted barb wire, jobbers' carload lots, $1.70; retailers' carload lots, $1.75, with 30c for galvanizing; plain wire to jobbers in carloads, $1.50, and to retailers in carloads, $1.55; polished staples, $1.70; galvanized staples, $2.

Wire Rods.—A number of rod contracts have been recently closed, but most of them were at low prices before the recent advance of the market. Present prices are quoted at $28 to $29 Pittsburg on Bessemer and $29 to $30 Pittsburg on open-hearth rods.

Coke.—No important developments in coke are noted since the closing of the large contract by the Thompson-Connellsville Coke Co. with the Jones & Laughlin Steel Co., which was reported last week. This contract is intended to furnish the needs of the four furnaces of the Jones & Laughlin Steel Co. now building at Aliquippa, Pa., and it will begin to run when the first of these furnaces is completed, which is expected to be about Nov. 1. As the contract is for a term of three years, it signifies that for the present a coke plant will not be erected in connection with the Aliquippa works as originally planned. The price is reported to have been about $2 ovens. Another large steel interest has taken on a quantity of furnace coke for its last half requirements in excess of its own production. This contract involves 50,000 tons or upward and was closed at a price of $1.60 ovens. The condition of the furnace coke market at present is quiet, as most pig iron interests which intend to operate the last half have covered against their needs. Some foundry contracting is being done. We quote spot furnace coke at from $1.50 to $1.60 ovens and on contract from $1.60 to $1.70 ovens according to grade. On first class Connellsville foundry coke the range is from $1.80 to $2 ovens for prompt shipment, and on contract from $1.90 to $2.25 ovens. The *Courier's* figures for the week ending May 22 show 24,090 ovens active with an output of 278,729 tons, compared with 22,650 active ovens and a production of 252,485 tons the previous week.

Old Material.—Conditions in old material have settled down to a test of strength between the dealers and the mills, as the latter with the low prices accepted on finished products are unwiling to meet the ideas of the middlemen in scrap. The dealers are now asking $17 delivered for heavy melting steel, which is more than $1 in advance of the present market in basic pig iron. Consumers by confining their purchases to the hand to mouth variety, are avoiding as much as possible, the support of the asking prices. The dealers are quite firm in their present attitude, in the expectation that the increased steel works operations will eventually raise the market to their ideas. We quote gross tons delivered in the Pittsburg district as follows:

Heavy melting scrap, $15.75 to $16.25; rerolling rails, $15.75 to $16.25; bundled sheet scrap, $12.75 to $13.25; iron axles, $20 to $21; old iron rails, $18 to $18.50; No. 1 wrought scrap, $15 to $15.50;; old car wheels, $16 to $16.50; low phosphorus, $18.50 to $19; machine shop turnings, $10.50 to $11; cast borings, $9.25 to $9.75; No. 1 cast scrap, $15 to $15.25; malleable, $14 to $15; stove plate, $11.50 to $12.

CHICAGO.

Great Activity in Heavy Mill Products—Pig Iron Dull.

Office of THE IRON TRADE REVIEW,
1328 Monadnock Block, June 1.

Reports covering the condition of the market with regard to the heavier steel products are extremely optimistic. The leading interest enjoyed in May the largest tonnage for any month in two years and in all some 300,000 tons of steel was ordered for prompt shipment, all of which, with the exception of a small tonnage of rails and some of the agricultural implement business, is to be shipped before Oct. 1. In comparison with the normal capacity of the bar mills at Bayview, which average from 15,000 tons to 18,000 tons of bars a month, between 29,000 and 30,000 tons of actual specifications for steel bars were received last month. The current orders for plates and shapes exceed the capacity of the mills of the Illinois Steel Co. Thus far fairly prompt delivery is still possible and shipments on assorted orders are completed within 30 days. The price of steel bars has been advanced to 1.25c Pittsburg by the Cambria and Republic Steel companies and a minimum of 1.35c to 1.38c Chicago obtains. Plates and shapes are held strongly at 1.30c Pittsburg and some of the mills are not soliciting any business at that price. During the past month, about 250,000 tons of fabricated steel contracts were placed. In this market at present, there is about 100,000 tons of inquiries on which prices are being asked and the tonnage upon which bids are already in amounts to about 50,000. Inquiries for about 100,000 tons of rails are reported. The demand for wire products is exceedingly brisk. The scrap market continues to move upward with regard to price and the local market is not only well supported by local consumption but has been strengthened by shipments to the Pittsburg district. Pig iron is dull, though a little more life is being displayed by some of the malleable interests.

Pig Iron.—The general pig iron situation is dull. Sales of southern iron are light. Southern iron sold during the week brought $11.50 Birmingham for No. 2 for third quarter delivery and $11.25 for prompt shipment. It is generally conceded that $11 can be done on immediate shipment lots. In the north, there is apparently a slightly increased demand from some of the malleable foundries, the presumption being that delayed purchases are now being made at the lower prices. Those interests which are accustomed to buy iron on yearly contracts are experiencing some difficulty in placing their orders for their requirements in 1910, principally because the furnaces are not disposed to take business ahead at current prices. We quote for Chicago delivery as follows:

Lake Superior charcoal	$19.50 to 20.00
Northern foundry No. 1	16.65 to 17.15
Northern foundry No. 2	16.15 to 16.65
Northern foundry No. 3	15.65 to 16.15
Southern foundry No. 1	16.35 to 16.85
Southern foundry No. 2	15.85 to 16.35
Southern foundry No. 3	15.35 to 15.85
Southern foundry No. 4	14.85 to 15.35
Southern No. 1 soft	16.35 to 16.85
Southern No. 2 soft	15.85 to 16.35
Southern gray forge	13.85 to 14.35
Southern mottled	13.60 to 14.10
Southern silveries, 4 per cent silicon	17.60 to 18.10
Southern silveries, 5 per cent silicon	18.10 to 18.60
Southern silveries, 6 per cent silicon	18.60 to 19.10
Jackson Co. silveries, 6 per cent	19.90
Jackson Co. silveries, 8 per cent	20.90
Jackson Co. silveries, 10 per cent	21.90
Malleable Bessemer	16.40 to 16.85
Standard Bessemer	17.00 to 17.50
Alabama basic	16.35 to 16.85

Billets.—The increasing demand from their own mills has induced a firmer attitude on the part of steel makers and better prices seem probable for billets. The tonnage of forging billets in this market moves in small quantities, but prices under $26 can no longer be obtained. It is also reported that certain makers have advanced the price of sheet bars $1 a ton. This means little more than a strengthening of the situation, as the price on these bars has not been very definitely fixed. We quote on the basis of $21 Pittsburg for rolling billets, as follows: For 4 x 4 rolling billets, $24, and for forging billets, $26, Chicago base.

Merchant Bars.—The strength of the steel bar situation, particularly in the east, is reflected in the advanced price announced by the Cambria Steel Co. which now offers a minimum price of 1.25c f. o. b. Pittsburg. The number of instances where better than 1.20c Pittsburg has been done is steadily decreasing and only exceptional circumstances, if any, will bring out better than this price and these instances are practically confined to shipments from western mills. Specifications on steel bar contracts are holding up very well and the current volume of new orders can be said to be in proportion to the usual volume of business that accompanies a rising market. Bar iron, while showing less aggressive activity, is stronger and the tonnage fair. Prices are again approaching 1.30c Chicago. The tonnage of hard steel, in bars and angles, is steadily improving and there is little business being placed at less than 1.25c Chicago. We quote as follows:

Bar iron, 1.30c; soft steel bars and bands, 1.35c to 1.38c; half extras; soft steel angles, less than 3 x 3, 1.48c; hoops, 1.78c base, full extras, planished or smooth finished tire steel, 1.58c; iron finish, up to 1½ x ½-inch, 1.53c base tire card; iron finish, 1½ x ½-inch and larger, 1.38c base steel card; channel for solid rubber tire, ¾ to 1 inch, 1.88c, and 1⅛-inch and larger, 1.78c; smooth-finished machinery steel, 1.63c; flat sleigh shoe, 1.43c; concave and convex sleigh shoe, 1.63c; cutter shoe, 2.75c; toe calk steel, 1.93c; railway spring, 1.73c, base steel card; vehicle spring steel, 1.78c, base vehicle card; crucible tool steel, 7c to 9c, with higher prices asked on special grades. Quotations on shafting are 60 per cent off the list for carload lots, and 55 per cent off for less than carload lots, carload freight allowed to points in base territory. On iron and steel bars from local stocks, we quote as follows: Bar iron, 1.70c to 1.80c full extras; soft steel bars, 1.50c per 100 pounds base, plus half extras; soft steel hoops, 2.10c, full extras.

Plates.—The situation with regard to plates continues to feel the impetus of bridge and building construction. There is also a very noticeable increase in the amount of work that boiler and tank shops are taking in and their requirements are already a respectable percentage of the volume of plate tonnage. There is no room for doubt that prices are correspondingly firm and where instances of lower prices are pointed out it is usually cases in which customers have been able to close on the basis of a proposition submitted some time ago.

For mill prices see Pittsburg report. Freight to Chicago, 18 cents. We quote for shipment from local stocks as follows:

Tank steel, ¼-inch and heavier, up to 72 inches wide, 1.60c to 1.70c; from 72 inches wide to 96 inches wide, 1.70c to 1.80c; 3/16-inch up to and including 60 inches wide, 1.70c to 1.75c; 72 inches wide, 1.95c to 2c; No. 8 up to 60 inches wide, 1.70c to 1.75c. Flange and head quality, 25c extra.

Sheets.—The increased firmness in sheet bars and the continuance of a good tonnage of sheet business has improved price conditions somewhat in the past week. The further reductions that for a time seemed likely for sheets are now apparently not imminent.

For mill prices, see Pittsburg report. Freight to Chicago, 18 cents. We quote store prices at Chicago as follows:

No. 10, 2c to 2.10c; No. 12, 2.05 to 2.15c; No. 14, 2.10c to 2.20c; No. 16,

2.20c to 2.30c; Nos. 18-20, 2.50c to 2.55c; Nos. 22-24, 2.55c to 2.60c; No. 26, 2.60c to 2.65c; No. 27, 2.65c to 2.70c; No. 28, 2.75c to 2.80c; No. 30, 3.05c; galvanized sheets, Nos. 10 to 16, 3c to 3.10c; Nos. 18 to 20, 3.05c to 3.15c; Nos. 22 to 24, 3.20c to 3.25c; No. 26, 3.40c to 3.45c; No. 27, 3.60c to 3.65c; No. 28, 3.80c to 3.90c; No. 30, 4.20c to 4.50c.

Structural Steel.—For the first time in nearly two years, it is reported that the leading fabricating interest has been unable to obtain its full requirements of shapes, particularly 24 and 12-inch I beams, in the first rolling following the requisition. Rolling schedules on structural shapes at all of the mills supplying this territory are well filled and one interest reports that an advance of $1 a ton above the 1.30c Pittsburg price was paid, presumably for very prompt delivery. The Boston store, in this city, which is to build an addition next year, closed last week the contract for 4,000 tons of steel, which is to be fabricated and held. The order was placed with the South Halsted Street Iron Works and indicates a conviction that prices will be materially higher and prompt delivery much more difficult to obtain a year from now. It is also reported that action will soon be taken in the matter of letting the steel contract for the Carson, Pirie, Scott Co. warehouse at Eighteenth street and the river in which there will be 5,000 tons of steel. The Brandies theater at Omaha will be erected by the Thompson-Starret Co., general contractors, which will award the steel contract at once.

The contract for 3,000 tons for the Utah hotel at Salt Lake City is reported as placed with the American Bridge Co. The Heineman building, 275 tons, the Beck building 90 tons, and the Powell Investment Co. 150 tons, all at San Francisco, were placed with the Pacific Rolling Mills, the Western Iron Works, and the Schrader Iron Works, respectively. Bids are in on the Winner bridge at Kansas City and the Peoria-Pekin Union Ry. bridge. Bids are being received on 300 tons for a reinforced concrete addition to the Studebaker building in this city, and for 1,500 tons for two bridges for the Chicago, Milwaukee & St. Paul Ry. Prices are improving, though more slowly than might be expected. For mill prices see Pittsburg report. Freight to Chicago, 18 cents. We quote from local jobbers' stocks as follows:

All angles, 3 inches and larger, including 6 inches, $1.60 per 100 pounds; angles over 6 inches, $1.70 per 100 pounds base; beams, 3 to 15 inches, inclusive, $1.60 per 100 pounds base; channels, 3 inches and larger, $1.60 per 100 pounds base.

Rails and Track Supplies. — Inquiries for 72,000 tons of rails for the Harriman lines, and 15,000 tons for the Northern Pacific, together with a quantity of miscellaneous requirements, make up a total of about 100,000 tons of rails to be purchased at once for western roads. A good proportion of these are open-hearth, as were the 26,000 tons ordered last week by the Santa Fe. For standard sections, see Pittsburg report. We quote as follows: Light rails, 40 and 45-pound, $26; 30 and 35-pound, $26.75; 16, 20 and 25-pound, $27; 12-pound, $28. In lots of 250 to 500 tons a reduction of 60 cents a ton from these prices is made; lots of 500 tons and up carry a reduction of $1 a ton. Track supplies, f. o. b. Joliet, angle bars, 1.50c to 160c; spikes, 1.75c; track bolts, with square nuts, 2.15c to 2.20c; with hexagon nuts, 2.30c to 2.40c; small railroad and square boat spikes, 1.90c base, f. o. b. Chicago.

Merchant Pipe and Boiler Tubes.—The leading interest reports a gratifying increase in the tonnage of its tubular goods, although this trade has not experienced the heavy buying which is loading down the mills on other products. The reports of higher prices for pipe and tubes seem to be without foundations. We quote for lap-weld tubes out of store, 65 off, and for charcoal, 50 off. For mill discounts, see Pittsburg report.

Cast Iron Pipe.—The American Car & Foundry Co. will make at its Detroit shop, 100 tons of pipe for Saginaw, Mich., and J. B. Clow & Son will furnish a like amount for Sidney, O. The American Cast Iron Pipe Co., of Birmingham, took the contract for 400 tons for Halstead, Kan. There is to be let at Waukesha, Wis., 300 tons, 300 tons at St. Edwards, Neb., and 200 tons at Clovis, N. Mex. Prices continue firm and we quote as follows:

Four-inch water pipe, $27.50; 6 to 14-inch, $26.50; larger sizes, $25.50; gas pipe, $1 a ton higher.

Wire Products.—The tonnage of barb wire and fence wire still being taken by the leading interest and other manufacturers is surprisingly large. Wire nails also are in good demand. Although there is some dissatisfaction among the hardware dealers because of the price reductions, the more recent advance of $2 seems to be accepted favorably and the orders are being placed freely at these prices. We quote:

Wire nails, jobbers' carload lots, $1.88; retailers' carload lots, $1.93; retailers, less than carload lots, $2.03; painted barb wire, jobbers' carload lots, $1.88; retailers' carload lots, $1.93, with 30c for galvanizing; plain wire to jobbers in carloads, $1.68; staples, $1.88. Wire rods, Bessemer, $27; open-hearth, $28; chain rods, $27, f. o. b. Pittsburg.

Old Material.—The support of higher prices and a considerable demand for scrap in the Pittsburg and valley districts, coupled with a continuance of the moderate demand from local consumers, has preserved the strength of the scrap market here. A round tonnage of material has been shipped to the east from local stocks. Aside from the fact that it is not easy to entirely reconcile prices of old materials with the prices of finished products there seems to be legitimate reason for the higher prices prevailing. The local market price is largely determined, however, and the following prices are based on what is developed by dealers' transactions. We quote as follows gross tons in the first paragraph:

Old car wheels	$15.00 to 15.50
Old iron rails	17.25 to 17.75
Rerolling rails (4 ft. and over)	15.25 to 15.75
Old steel rails (4 ft. and under)	14.50 to 15.00
Light section relayers, 45 lbs. and under subject to inspection	21.00 to 23.00
Relaying rails, subject to inspection	19.00 to 19.50
Frogs, switches and guards	14.00 to 14.50
Heavy melting steel	14.00 to 14.50

We quote, net tons, as follows:

No. 1 R. R. wrought	$13.50 to 14.00
No. 2 R. R. wrought	12.50 to 13.00
Knucklers, couplers and springs	13.25 to 13.75
Shafting	15.75 to 16.25
Iron car axles	18.25 to 18.75
Steel car axles	17.00 to 17.50
Dealers' forge No. 1	10.00 to 11.00
Pipes and flues	10.00 to 10.50
No. 1 cast, 150 lbs. and less	13.75 to 14.25
No. 1 mill	7.25 to 7.75
Mixed busheling (Nos. 1 and 2)	8.50 to 9.00
Country sheet	5.00 to 5.50
No. 1 boiler cut	9.75 to 10.25
Boiler punchings	12.00 to 12.50
Cast borings	5.75 to 6.25
Mixed borings, etc	5.75 to 6.25
Machine shop turnings	7.50 to 8.00
Railroad malleable	13.00 to 13.50
Agricultural malleable	11.25 to 11.75
Stove plate and light cast scrap	12.00 to 12.50
Old iron splice bars	16.00 to 16.50

CLEVELAND.

Price Cutting in Rivets and Shafting—Pig Iron Prices Higher.

Office of THE IRON TRADE REVIEW, Browning Bldg., June 1.

Iron Ore.—Buying of iron ore continues, and there now seems to be no doubt as to the ability of the mining companies to maintain prices. The strike on the lakes is irritating, but there are more vessels in commission than are demanded by the trade.

On base ores with the guarantee of 55 per cent on old range and Mesabi Bessemer, and 51½ per cent on old range and Mesabi non-Bessemer, we quote as follows: Old range Bes-

semer, $4.50; Mesabi Bessemer, $4.25; old range non-Bessemer, $3.70; Mesabi non-Bessemer, $3.50.

Pig Iron.—While buying is not heavy, the market is sentimentally very strong, and prices are somewhat higher. Local furnaces are now asking $15 furnace for delivery outside of the city, and from $15.25 to $15.50 delivered in the city. The outlook is that there will be a slight advance, but that there will be no decided change in the quotations for some time. We quote delivered in Cleveland as follows:

No. 1 foundry	$15.75 to 16.00
No. 2 foundry	15.25 to 15.50
No. 3 foundry	14.75 to 15.25
No. 2 southern	15.35 to 15.85
Gray forge	14.00 to 14.50
Bessemer	15.65 to 15.90
Lake Superior charcoal	19.00 to 19.50
Jackson Co. 8 per cent silvery	20.05

Coke.—The market is quiet, with no developments of importance. We quote spot furnace coke at $1.50 to $1.65 at the ovens, and on contract $1.70 to $1.75; for first class Connellsville foundry coke, we quote spot at $1.80 to $2, and on contract $2 to $2.25.

Finished Materials.—Buyers are urging delivery, and conditions in most lines are very satisfactory. There is very little contracting, as some mills decline to make any contracts, while others will not enter into obligations beyond Oct. 1. Almost the only exceptions to the firmness of present prices are furnished by shafting and rivets. On the latter, the market has recently declined from 1.90c to 1.60c, and probably even lower than that could be done. The competition in rivets is fierce. On nuts and bolts, however, prices are reasonably well maintained. On steel bars, some interests are quoting 1.25c Pittsburg, but the usual quotation is still 1.20c. The plate market is firmer, and 1.30c Pittsburg is now being well maintained. The Upson Nut Co. has awarded the contract for its new ore bridge at its river furnace to the Wellman-Seaver-Morgan Co., calling for about 400 tons of structural material, which will be furnished by the Carnegie Steel Co. The contract for the bins and trestle for the Upson furnace, calling for 350 tons of plates, which will be furnished by the Otis Steel Co., was awarded to the Variety Iron & Steel Works Co. A number of Cleveland manufacturers, notably the Brown Hoisting Machinery Co., report a highly gratifying increase of business last month. The demand for bar iron has shown some improvement during the past week.

Old Material.—Another advance in prices took place the past week, this being more especially true of wrought iron, No. 1 railroad iron axles and old iron rails moving upward 50 cents a ton as did also steel boiler plate and car wheels. Mills are buying material although not in large quantities, but yet old material is finally passing into the hands of consumers. We quote f. o. b., Cleveland, as follows:

Old iron rails	$16.50 to 17.00
Old steel rails (re-rolling)	15.00 to 15.50
Old steel rails (under 6 feet)	15.00 to 15.50
Old car wheels	15.50 to 16.00
Old steel boiler plate	12.50 to 13.00
Malleable iron (railroad)	14.00 to 14.50
Steel axles	17.50 to 18.00
Malleable iron (Agricultural)	13.50 to 14.00
Heavy steel	14.25 to 14.75
Country mixed steel	13.00 to 13.50
Low phosphorus	16.00 to 16.50

We quote, net tons, as follows:

No. 1 R. R. wrought	$14.00 to 14.50
No. 1 busheling	12.00 to 12.50
No. 1 machine cast	12.50 to 13.00
Iron axles	17.50 to 18.00
Axle turnings	9.50 to 10.00
Machine shop turnings	8.00 to 8.50
Grate bars	11.00 to 11.50
Pipes and flues	11.50 to 12.00
Tank iron	10.00 to 10.50
Hoop and band iron	9.00 to 9.50
Sheet iron	8.00 to 8.50
Wrought drillings	8.00 to 8.50
Stove plate	11.00 to 11.50
Cast borings	7.00 to 7.50

NEW YORK.

Pig Iron Market Strong—Many Structural Contracts Pending.

Office of THE IRON TRADE REVIEW, Room 1005, No. 90 West St., June 1.

Pig Iron.—Bookings of the month just ended were generally the heaviest since the beginning of the depression, and June opens with the market in a strong and healthy position. Prices have advanced moderately all along the line and the weak spots have practically all been eliminated, but there is enough idle capacity in this district to prevent any sharp rise in the early future. The basic movement in eastern Pennsylvania has not been shared in to any important extent by sellers in this territory, but of course has exerted considerable influence through diverting a considerable tonnage of capacity from foundry channels. Through this section the foundry melt seems to be gaining slightly; textile machinery manufacturers in lower New England are extremely busy and recently have taken on large tonnages of iron, and foundries turning out structural iron expect a brisk call for their products in connection with the heavy building contracts recently placed in New York. Prices are firm on a basis of $16.50, delivered, for No. 2X foundry. Forge iron is scarce and prices are tending upward. We note three recent sales of Buffalo product, 1,000 tons each, on which prices were successively higher. There has been a little selling of low phosphorus iron, but no important tonnages are under negotiation. The buying movement is still holding up well, but it would not be surprising if the market assumes a more quiet tone in the early future, as buying is always more or less in spurts and that now current has continued for some time. We quote, New York tidewater delivery, third quarter, as follows:

Northern foundry No. 1	$17.00 to 17.50
No. 2X foundry	16.50 to 17.00
No. 2 plain	16.00 to 16.50
No. 2 southern foundry	16.00 to 16.50
Malleable	17.25 to 17.75
Gray forge	15.25 to 15.75

Ferro-Alloys.—Several eastern steel makers have bought fair tonnages to supplement contracts placed some months ago for their estimated year's requirements, this probably aggregating 1,200 or 1,500 tons, and there has also been some buying by central western interests. The price continues at about $41, seaboard, for fairly early shipment. A good inquiry is current for ferro-silicon, probably 300 tons being under negotiation, and the price continues at $64 to $65, Pittsburg.

Finished Materials.—May bookings of structural materials are estimated at about 225,000, of which independent interests took about 170,000 tons and the American Bridge Co. slightly under 55,000 tons. This tonnage is not equal to the latter company's maximum capacity, but its operations are steadily improving, and through the summer it will probably run at between 65 and 70 per cent of normal, with the two largest plants, Pencoyd, rated at 9,000 tons, and Ambridge, rated at 17,000 tons, running at a much larger percentage. In fact, the latter works may be forced onto double turn in the near future, as it is now producing close to its maximum on single turn. The plant at Elmira, which has never yet been operated up to its rated capacity of 5,000 tons per month, Trenton and Edge Moor are filling up rapidly.

Bids were opened a few days ago on the substructure of the postoffice building at the Pennsylvania station in this city, for which 9,000 tons of steel will be required, but it is understood that the low bid has been withdrawn and the project will probably be readvertised. Some of the girders involved in this contract weigh 70 or 80 tons each, and their transportation is a factor of importance. The Vanderbilt hotel letting, requiring 5,000 tons of steel, was set for last Friday, but was postponed until the current week. The Hinkle Iron Co.

has taken a 270-ton factory building on Greenwich street; A. E. Norton & Co., a 700-ton loft structure on Twenty-seventh street; the New England Structural Co., the Boston & Albany grain elevators at South Boston, 5,000 tons; James Stewart, the Puget Sound Realty Co. building at Denver, 3,000 tons; and the Boston Bridge Co., 300 tons for the Pepperill cotton mill at Midford, Me.

In railroad work the McClintic-Marshall Construction Co. has taken 2,300 tons for the Pennsylvania Tunnel & Terminal Co., and Lewis F. Shoemaker will furnish 1,700 tons for the same interest; the Pennsylvania Steel Co. will furnish 1,600 tons for the Seaboard Air Line and 700 tons for the Grand Trunk system, which has also ordered 1,430 tons from the Wisconsin Bridge Co.; the Rock Island has bought about 2,100 tons of bridge work, Geo. W. Jackson securing 1,500 tons of the order and McClintic-Marshall the balance; and the American Bridge Co. has taken 500 tons of bridge work for the Milbrook Co.

The Winner bridge, 13,000 tons, is still pending, as is also the Hewitt apartment in this city, 4,000 tons. The Utah Hotel at Salt Lake City, 2,500 tons, will probably go to the American Bridge Co., and the Boston store building at Chicago, 5,000 tons, has gone to the South Halsted Street Iron Works. The First National Bank building at Denver and the Portland, Me., city hall have gone to independent interests. The Peoria & Pekin Union has received bids on 2,200 tons of bridge work; a cotton shed at Vicksburg will require 1,000 tons; Oswego is to let contracts for an 800-ton bridge within the next two weeks; the Bishop Foss mill building in East Boston, requiring a large tonnage, is being figured; Portland, Me., has an 800-ton bank building under negotiation, and there is a large variety of smaller propositions. The Carnegie Steel Co. will supply 500 tons of plain materials for the Erwin cotton factory. A very heavy tonnage of steel is involved in additions to New England textile mills, either present or prospective. Local fabricators are filling up on orders, and substantial advances in the prices of fabricated steel are anticipated.

The recently established level on plain materials is being well maintained. Iron bars are in better demand and mills are operating more heavily. We quote:

Angles, 3 to 6 inches x ¼-inch and heavier, 1.46c; beams, 3 to 15 inches, 1.46c; tees, 3 x ¼-inch and heavier, 1.51c; plates, carloads, tank, 1.46c; marine boiler, 1.86c; bar iron, 1.35c to 1.40c; soft steel bars, 1.36c; sheets, No. 28 black, 2.56c.

Cast Iron Pipe.—The leading interest has taken an order for 3,500 tons of heavy pipe for New Chester, Pa. The local market is quiet and prices continue low.

Old Materials.—Considerable buying has been done by one steel interest in eastern Pennsylvania, partly from dealers but largely from railroads. Otherwise no large lots of melting steel scrap have been sold, and the same is true of practically all other lines. Prices continue to advance sharply. In some cases brokers are now offering and paying considerably more than mills are willing to pay, counting on the advance continuing sufficiently long to let them out on the transaction. Denial is made that the Steel Corporation is in the market for large tonnages for its Gary plant, as has been reported. We quote:

Old steel rails (rerolling)	$13.50 to 14.50
Relaying rails	19.00 to 19.50
Old car wheels	13.00 to 13.50
Old iron car axles	18.00 to 18.50
Old steel car axles	15.50 to 16.00
Heavy melting steel	12.00 to 12.50
No. 1 railroad wrought	15.50 to 16.00
Iron track scrap	13.50 to 14.00
Wrought pipe	11.50 to 12.00
Cast borings	7.50 to 8.00
Wrought turnings	8.50 to 9.00
Heavy cast scrap	12.50 to 13.00
Railroad malleable	11.50 to 12.00
Stove plate	10.00 to 10.50
Grate bars	10.00 to 10.50

CINCINNATI.

Test of the Southern Market Will Probably Come About July 1.

Office of THE IRON TRADE REVIEW,
First National Bank Bldg., June 1.

Pig Iron.—The market the past week has been quiet, with inquiry light and confined to small, unimportant tonnages. A sale of 2,500 tons of basic iron to a southern Ohio consumer for last half delivery and 1,000 tons of malleable to a St. Louis melter were the only important transactions reported. Prices have made no change and for prompt shipment southern iron $11 Birmingham seems to be still quoted, although business is not solicited so freely on that basis as in the recent past. For prompt shipment northern iron, the southern Ohio furnaces are generally asking $14.50 for No. 2 at furnace, but it is intimated that for No. 1 foundry $14.50 can be done the same as for No. 2 and for No. 3 foundry $13.75 has been quoted, showing that the market is a little easy on grades other than No. 2 foundry. For last half, $14.50 Ironton appears to be well maintained, and in the south $11.50 Birmingham for last half is firmly adhered to by the furnaces. Some producers are demanding $12 for fourth quarter. Gray forge is obtainable at $10.25 Birmingham, but is not plentiful. Jackson county high silicons remain quotable at $18.50 at furnace for 8 per cent. Southern charcoal is selling at $19.50 Birmingham. The falling off in inquiry is accepted as the natural result following a period of active buying and the market is expected to remain in a rather quiet and featureless position for the present. The test of the strength of the southern iron market it is thought will come to light about the first of July, when new contracts for last half delivery begin. The bulk of this iron was sold at $11 Birmingham, and if prompt shipment iron can be held up to the $11.50 basis, the price now asked for last half delivery, it would tend to give the market a strong tone. We quote for prompt shipment and June delivery, delivered Cincinnati, based on freight rates of $3.25 from Birmingham and $1.20 from Ironton, as follows:

Southern foundry No. 1	$14.75 to 15.25
Southern foundry No. 2	14.25 to 14.75
Southern foundry No. 3	13.75 to 14.25
Southern foundry No. 4	13.75
Southern No. 1 soft	14.75 to 15.25
Southern No. 2 soft	14.25 to 14.75
Southern gray forge	13.50 to 13.75
Northern No. 1 foundry	15.95 to 16.20
Northern No. 2 foundry	15.70
Northern No. 3 foundry	14.95 to 15.20
Jackson county 6 per cent silicon	18.70
Jackson county 8 per cent silicon	19.70
Jackson county 10 per cent silicon	20.70

Finished Material. — Specifications have been fairly good on contracts, but were not equal to the large tonnage specified two and three weeks previously. The market appears to be less active since prices have become steadier. While quotations of 1.20c for steel bars are still reported, some producers are asking 1.25c.

Coke.—There is still considerable shopping by foundrymen for coke on contract for deliveries over the remainder of the year and for one year from July 1. The market is showing some firmness and there is less inclination on the part of the ovens to accept low prices recently prevailing on prompt shipment coke. We give below quotations showing the range of prices in the leading coke producing districts, the inside quotations representing prompt shipment coke and the outside prices contract:

	Per Ton.
Wise county furnace coke	$1.60 to 1.85
Wise county foundry coke	2.00 to 2.25
Pocahontas furnace coke	1.65 to 1.85
Pocahontas foundry coke	1.85 to 2.25
Standard Connellsville furnace coke	1.60 to 2.00
Standard Connellsville foundry coke	1.90 to 2.40

Old Material.—The market is firm in tone and some grades of scrap are held above pig iron prices. There is considerable activity in the market be-

tween dealers, but consumnrs who can use either scrap or pig iron are inclined to resist the advances recently made in scrap and are using pig iron more freely. Dealers' prices here are represented in the following quotations, with the market regarded as firm:

Old No. 1 R. R. wrought net tons	$13.50 to 14.00
No. 1 machinery, net tons	13.00 to 13.50
Old iron rails, gross tons	15.50 to 16.50
Old steel rails (re-rolling) gross tons	14.50 to 15.00
Old short lengths, gross tons	14.00 to 14.50
Old iron axles, net tons	17.00 to 17.50
Heavy melting scrap, gross tons	13.25 to 14.00
Stove plate, net tons	11.00 to 11.50
Heavy turnings, net	9.00 to 9.50
Cast borings, net tons	6.50 to 7.50
Car wheels	14.50 to 15.00

PHILADELPHIA.

Continued Activity in Basic—Firmer Prices in Finished Lines.

June 1.

Pig Iron.—Despite the advance in price to $15.50, delivered, basic iron has continued its activity during the week under review. Several steel works in this immediate district, which bought rather heavily for early shipment when the movement started on the $15 level, have re-entered the market and taken on moderate lots for shipment later in the year at the full price. While these purchases have been quite heavy, there is reason to believe that figures mentioned in connection with the aggregate tonnage placed during the movement have been somewhat exaggerated. One of the interests which sold most heavily and is perhaps best qualified to speak with authority in this instance estimates that the total purchases of steel plants in this section during the recent movement have not exceeded 125,000 tons; probably one-half of this tonnage was at the $15 level, but on all later purchases the full $15.50, delivered, price prevailed. The movement seems to have spent itself, however, and no further buying of importance is anticipated for some time, as consumers generally have covered their requirements through the remainder of the year and will need little additional iron unless a sudden spurt of business develops. There have been a few small sales of low phosphorus iron, one of the most desirable brands going on the basis of $19.50 to $20, delivered at Eastern Pennsylvania plants. Foundry irons continue to enjoy a steady demand and are now firmly established at $16, delivered, for No. 2 plain and $16.50 for No. 2X. No large purchases are reported, but the smaller lots are sufficiently numerous to aggregate a good tonnage. One sale of 1,000 tons of malleable was recently made at a price of $17.50, delivered. Pipe irons are scarce and are being held at $15.25 to $15.75, delivered, but no sales of importance are noted. Reports from a number of representative selling interests are that bookings during May were the heaviest in a long period. We quote, Eastern Pennsylvania delivery during the third quarter, as follows:

No. 1X foundry	$17.00 to 17.50
No. 2X foundry	16.50 to 17.00
No. 2 plain	16.00 to 16.50
Standard gray forge	15.25 to 15.75
Basic	15.50
Low phosphorus	19.00 to 20.00
No. 2 Birmingham	15.75 to 16.25
No. 2X Virginia	16.75 to 17.25
No. 2 plain Virginia	16.25 to 16.75

Finished Materials.—Prices are stiffening and, while there are still a few interests willing to book attractive tonnages at concessions from the usual price, their number is decreasing. The Cambria Steel Co. has let it be understood that it will accept no business at less than the established figures. The local structural situation presents no new features. The Phoenix Bridge Co. will supply the Seaboard Air Line with a small lot of bridge work and some other lettings have been made. The Reading awards for street bridges, announced for June 9 and 15, will involve between 4,000 and 5,000 tons and will complete the requirements for this railroad's track elevation work. Shipyard orders are reported as light, but the Cramps still have a large tonnage under negotiation and considerable buying is expected from that interest before long. The inquiries are said to aggregate 30,000 tons. The placing by the Harriman lines of orders for 105 locomotives, a good part of which are extremely heavy, is expected to stimulate buying by the Baldwin Locomotive Works; these are to go to the Union and Southern Pacific and constitute one of the largest single orders for locomotives ever placed. We quote: Structural shapes, 1.45c to 1.50c; plates, 1.45c to 1.50c; sheets, No. 28, 2.80c; steel bars, 1.35c to 1.45c; refined bar iron, 1.35c to 1.40c.

Old Materials.—Prices have experienced another advance without any business of importance being developed. Holders of scrap are still unwilling to part with it at the current level, insisting that considerably higher figures will prevail, and their opinion is seemingly supported by the eagerness with which certain mills are seeking heavy melting steel. A ship load of 1,000 tons of San Francisco scrap has been taken here by a dealer at a figure above $15.50, delivered Eastern Pennsylvania mill. We quote:

Old steel rails (rerolling)	$16.75 to 17.25
No. 1 steel scrap	15.50 to 16.00
Old steel axles	20.00 to 20.50
Old iron axles	22.00 to 23.00
Old iron rails	18.50 to 19.50
Old car wheels	15.50 to 16.00
Choice scrap R. R. No. 1 wrought	18.50 to 19.00
No. 1 yard scrap	16.50 to 17.00
Machinery scrap	15.00 to 15.50
Low phosphorus scrap	19.50 to 20.00
Wrought iron pipe	15.50 to 16.00
No. 1 forge fire scrap	13.00 to 13.50
No. 2 forge fire scrap, ordinary	8.50 to 9.00
Wrought turnings	12.50 to 13.00
Axle turnings, heavy	13.00 to 13.50
Cast borings	10.50 to 11.00
Stove plates	13.00 to 13.50

ST. LOUIS.

Moderate Sales of Pig Iron With Prices Firm.

May 31.

Pig Iron.—The pig iron market closed last week with half a dozen or more sales of southern iron in 300, 200 and 100 ton lots for delivery over the last half of the year, with $11.50 as about the best price that can be made. This price seems to prevail now for all deliveries during the present year, one furnace at least having turned down orders at $11. One malleable casting company bought 1,000 tons of malleable for shipment over the last half, and an Illinois car manufactory purchased 500 tons of northern car wheel iron. A price of $11.25 for No. 2, Birmingham, is reported to have been made in one instance last week, but this is not a certainty. Ohio iron seems to be firm at $14.50 for No. 2 for extended deliveries, and at $14 to $14.50 for quick shipment. The demand for Ohio foundry grades is fair.

Our quotations, delivered, to which the freight of $3.75 from Birmingham has been added, are as follows:

No. 1 southern	$15.75 to 16.25
No. 2 southern	15.25 to 15.75
No. 3 southern	14.75 to 15.25
No. 4 southern	14.25 to 14.75

Coke.—It is asserted with a fair degree of positiveness that the 25,000 ton coke inquiry put out by a car manufacturing company ten days ago has not been placed. Another inquiry is out this week for about 8,000 tons of foundry coke for delivery over the last half. This probably will be closed within the next two or three weeks. Best-selected Connellsville 72-hour foundry coke is bringing $1.85 to $2, ovens for immediate shipment, and $2.15 to $2.25 for last half delivery. Some of the dealers are quoting $2.25 for delivery over the first of next year. Connellsville 48-hour furnace coke is still held at $1.60 to $1.75, ovens, for all deliveries. The market on Virginia and West Virginia grades was not changed last week.

Old Material.—The market on scrap

iron is brightening up considerable. Railroads are placing contracts, or getting ready to do so, and dealers look forward to considerable improvement. Our quotations follow:

Cast iron borings, free from foreign material, net tons	$ 5.00 to 5.50
Steel axle turnings, gross tons	10.00 to 11.00
Steel railroad axles, net tons	16.50 to 17.00
Iron railroad axles, net tons	17.50 to 18.50
Miscellaneous steel scrap, gross tons	9.00 to 11.00
Old car wheels, gross tons	14.50 to 15.00
No. 1 railroad cast scrap, net tons	11.00 to 11.50
Heavy machinery cast, net tons	12.00 to 12.50
Stove plate and light cast, net tons	10.00 to 10.50
Sheet iron, net tons, uncut	4.00 to 5.00
No. 1 railroad wrought, net tons	12.00 to 13.00
Railroad malleable, net tons	12.00 to 12.50
Heavy melting steel, net tons	11.00 to 12.00
Relaying rails, net tons	17.00 to 18.00

BUFFALO.

Pig Iron Prices are Tending Upward —Advance Expected Soon.

Office of THE IRON TRADE REVIEW, 932 Ellicott Square, June 1.

Pig Iron.—More strength has appeared in the market, but not sufficient to alter the approximated quotations given below. Furnaces are tightening up on prices and good tonnage was refused by certain interests at the maximum quotations named herewith. Selling, however, has continued at these prices. Just how much longer low figures will be made is doubtful, but it still appears to be almost a certainty that an advance is near at hand. One furnace interest refused $15.50 for No. 2X foundry within the past week.

No. 1X foundry	$15.00 to 15.50
No. 2X foundry	14.50 to 15.00
No. 2 plain	14.25 to 14.75
No. 3X foundry	14.00 to 14.50
Malleable Bessemer	16.50 to 17.00
Gray forge	14.00 to 14.50
Charcoal	19.25 to 20.25

Finished Products.—Few notable lettings have occurred, but regular trade has been stronger than usual. Representatives of certain mills say they are running two shifts and still are several weeks behind on deliveries. There is some activity in structural throughout the state. Bids will go in June 5 for structural on the Rome custodial asylum, Rome, N. Y., a state work. Specifications have not reached Buffalo. The general contract for the Courtland hospital, to the building of which the Wickwires of that city contributed $50,000, was let to the William R. Compton Realty Co., of Elmira, N. Y.

SEATTLE.

Moderate Improvement Continues in the Iron Market.

Office of THE IRON TRADE REVIEW, 302 Pioneer Bldg., May 28.

The iron market of the Pacific coast continues to show moderate improvement. The shipments of machinery to Alaska are unprecedented in volume. The foundries, with the exception of some shops in Tacoma, are all busy; taken as a whole, the north coast foundries are operating at about 80 per cent capacity. Most of the gasoline engine manufacturers are working overtime at present.

Pig Iron.—Most foundries are fairly well stocked and sales of iron for immediate needs are light. There is some contracting for European iron for late fall delivery and purchases of southern iron continue in good volume. A ship load of 1,000 tons of English No. 1 has been wrecked on the Cape Verde islands and will not arrive on Puget Sound until December. We quote gross tons, f. o. b. Seattle, as follows:

English, Cleveland No. 1, spot	$25.00 to 25.50
English, Cleveland, No. 1, to arrive July	24.50 to 25.00
English, Cleveland, No. 1, to arrive Oct.-Dec.	22.00 to 22.50
Southern No. 2, domestic	21.90 to 22.40

Merchant Iron.—Prices are being well maintained, but are still low. The volume of business is good. There have been recent shipments of considerable tonnage to Alaska and island points. We quote base prices per 100 pounds, f. o. b. Seattle: Common iron bars, $2.25; mild steel bars, $2.35; machinery steel, $2.75; Norway iron, $3.50; angles, channels and tees, under 3 inches, $2.75.

Old Material.—Dealers' stocks have decreased and the demand for good foundry scrap is increasing. Prices have advanced and it is difficult to obtain concessions from the ruling quotations. Wrought iron is slightly more active. We quote net tons, f. o. b. Seattle, as follows:

Foundry and machinery scrap	$19.00 to 20.00
Old car wheels	17.00 to 17.50
Old steel rails	8.00 to 9.50
Railroad wrought	10.00 to 11.00
Country wrought and busheling	5.50 to 8.00

BIRMINGHAM, ALA.

Increased Activity at Ensley—Plans of the Southern Steel & Iron Co.

May 31.

Some sales of pig iron are still being made by Alabama manufacturers, a steady line of inquiry is being received and the future prospects are bright. Four furnaces went out of commission during the past month and still it is believed there will be a good showing made in the production for the month. Two furnaces are prepared for the torch in the near future and the furnaces of the Southern Steel & Iron Co., the successor of the Southern Steel Co., will most likely be in operation before the end of the coming month. W. H. Hassinger, who was elected president of the new company, is back in Birmingham and says the prospects are bright. While not fixing a date for beginning on the preparations to put all the plants of the company in operation again, the intimation is given that within three or four weeks this will be taken up and efforts made to start up the various works of the concern, located in Tennessee, Georgia and Alabama.

The iron prices in this section are a little firmer. Not so much is being heard these days of $11 per ton iron, No. 2 foundry.

Reports are current that the Tennessee company will add a structural steel plant to the steel mills at Ensley. The rolling mills of the Tennessee company, located at Bessemer, resumed operations this week, after a month's idleness. Steel is worked altogether in this plant and employment is given to between 200 and 300 hands.

Shipments on the San Francisco order for cast iron pipe to be filled from this district have been started. This order will take several months to fill.

GERMAN IRON MARKET.

No Response to Improved Conditions in United States and England.

Dusseldorf, May 15, 1909.—Contrary to the lately reported improvements on the American and English iron markets, the German market continues to remain in bad condition. The strong efforts of the big banks, which keep large capitals of industrial shares in their deposits, to improve the standing of such shares by issuing many predictions of a quick and perfect improvement, have meantime had some effect at the Berlin stock exchange, but they have not been able to influence the business in iron and steel. For iron ore and scrap material, the demand has, however, grown and prices have raised a little. Coal is weaker, as it is always in the warmer season; coke is in such a depressed condition that the syndicate is not able to take even the 60 per cent of the capacity of its mines which it had guaranteed to take during May. It can only take 55 per cent. In pig iron, the production is unaltered; the prices have again given way and serious buyers can buy hematite today for second half of this year at 55 marks per 1,000 kilograms for producers' works ($13.10). With the relatively high prices for ores and a coke price

of 18 marks per 1,000 kilograms ($4.25), only a few of the best situated works see their money back in these prices. In half finished products and railway material, the report of the Stahlwerksverband for April is worse than ever before; the deliveries were only 364,669 tons against 520,811 tons in March, 1909, and against 371,956 tons in March, 1908. Plates, sheets and bar iron are just as depressed as they have been for months and there is no improvement for these articles in sight. Taking a broad view of the position here, it is rather generally unpleasant. Money, which was below 2 per cent in March, is today in demand at over 4 per cent, evidently in consequence of the payments which have been made against the new loan of 800,000,000 marks of the empire and of Prussia. Beside, the inland crisis regarding the new duties and taxes, which are necessary to satisfy the enormous demand for money of the empire and its states, has a very bad influence on the general business, the more as this crisis is not likely to be finished during this year.

METAL MARKETS.

NEW YORK.

June 1.

Copper.—On the strength of an improved consumption, the market has strengthened during the past week and heavy selling has been done both for domestic and foreign acocunt. Producers are resisting efforts of melters to book their requirements ahead of the early future. We quote: Lake, 13⅜c to 13½c; electrolytic, 13⅛c to 13¼c; casting, 13c to 13⅛c.

Pig Tin.—The market is steadier, demand having improved and the bulk of spot metal being concentrated in a few hands. The foreign situation has also improved. We quote 29¼c, New York.

Pig Lead.—A better demand has developed in the west, where prices have advanced, but the east has been slow to follow this example. We quote, New York delivery, at 4.35c to 4.45c.

Spelter.—The demand from galvanizers continues to improve, and prices are tending upward. We quote, 5.17½c to 5.22½c, New York.

Antimony.—Cookson's, 8¼c to 8⅜c; U. S., 7⅞c to 8c; ordinary brands, 7½c to 7¾c.

CHICAGO.

June 1.

The entire list of metals shows a stronger tone and higher prices prevail for spelter and lead. There was a good buying of copper during the week and zinc shows indications of higher prices. We quote as follows:

Lake copper, carload lots, 13¾c to 14c; casting, carload lots, 13½c to 13¼c; pig tin, 31c to 31½c; spelter, 5.35c to 5.50c; pig lead, desilverized, 4.50c to 4.60c in 50-ton lots; corroding, 4.75c to 4.80c in 50-ton lots; car lots, 2½c per 100 pounds higher; sheet zinc, 6¾c list f. o. b. LaSalle in car lots of 600-pound flasks; Cookson's antimony, 10½c to 11c; other grades, 10c.

The scrap metal trade is distinctly stronger and more active and better prices are being asked. We quote as follows:

Copper wire, 11¾c to 12c; heavy copper, 11½c to 11¾c; light copper, 10¾c to 11c; heavy red brass, 10¾c; heavy yellow brass, 8½c; light brass, 6¼c; No. 1 red brass borings, 8¾c; No. 1 yellow brass borings, 7¾c; brass clippings, 8¼c; tea lead, 3.60c; lead scrap, 3.90c; zinc, 3.40c; tin pipe, 24½c; tin foil, 23c; pewter, 17½c; electrotype plates, free from wood, 3.80c; electrotype dross, 2.65c; stereotype plates, 4⅛c; stereotype dross, 3.75c; prime slab zinc dross, $55 per ton.

ST. LOUIS.

May 31.

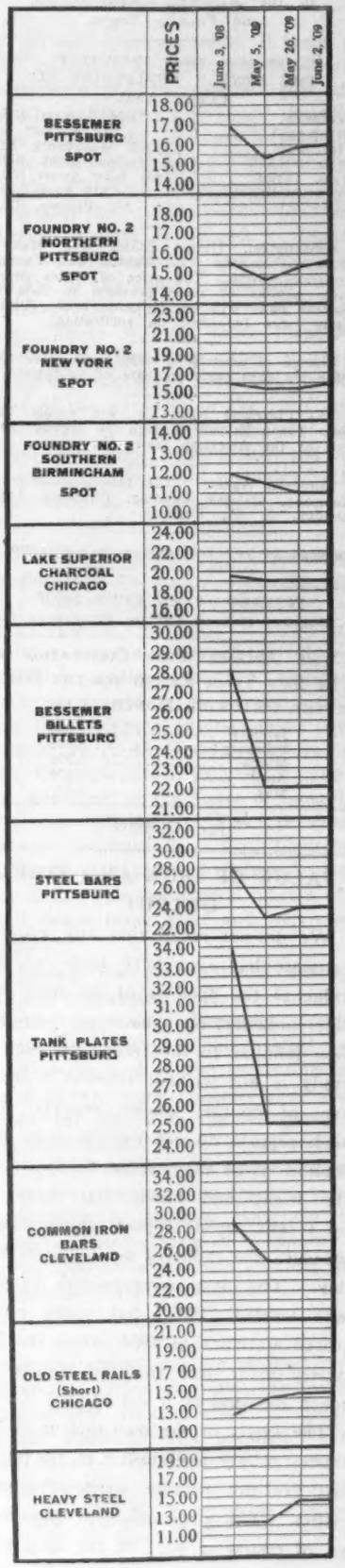
Lead and Zinc.—The best base price reported to have been paid for zinc ore in the Joplin district last week was $43.50, with offerings becoming much stronger toward the close of the week. On an assay base of $42.50 for 60 per cent ore, a price of $45.50 was realized. St. Louis quotations on spelter toward the close of the week rose to $5.15, but dropping to $5.12½ on Saturday, probably was responsible for the increase in ore prices. A curtailment in the output also probably influenced the rise. A prevailing base price of $43.50 with a steady demand for ore are the indications for the present week.

Calamine was steady at $19 base for 40 per cent ore, with extra choice ore bringing $26. Lead ore was firm at $58 base. Quotations on pig lead at St. Louis were stronger at $4.32½.

The National Tube Co. blew in four stacks in May: Riverside furnaces No. 2, on May 27, and No. 1 on May 30; Lorain No. 2 stack on May 3, and No. 1 stack on May 20, while Lorain No. 4 stack was blown out on May 4.

The Central Iron & Steel Co., Harrisburg, Pa., lighted its No. 1 Paxton furnace, May 6.

PRICE CHART.



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January	5,506
February	5,346
March	5,396
April	5,508
May	5,533

June 3, 1909.

VALUE OF IRON AND STEEL OUTPUT.

We do not recall that any general estimate has ever been made of the value of the product of the iron and steel industry, on a basis of computation familiar to the trade, yet such a study is not without interest. There are, of course, census reports, but such reports do not usually draw the limitations as they would be drawn in the trade, and beside this there is no recent census report which would measure the industry as it stands today. The last quinquennial census was labeled "1905," but really comprised statistics of 1904, when the industry made less than two-thirds as much pig iron as it did in 1907.

The limits of the iron and steel industry proper are familiar to the trade, but are not usually written in statistics. The production of pig iron is, of course, a part of the iron and steel trade, and as coke, ore and limestone go into the manufacture of pig iron, it is not necessary to consider them. When pig iron has been made, there comes a parting of the ways. Some pig iron goes to the iron foundry, some goes to the iron mill and some goes to the steel works. The iron foundry is not usually considered a part of the iron and steel trade in the strict sense. The iron foundry uses pig iron much the same as the hardware factory may use bands or sheets, which are products of the steel industry, or as a tin can or a carpet sweeper factory uses tin plate. Indeed, the agricultural implement factory uses both foundry pig iron, iron bars and steel bars, products of three branches of the iron and steel industry proper, but it is not a part of that industry.

Possibly the fairest system of limiting the iron and steel industry would be to stop with foundry pig iron, including malleable, with the steel casting, with the normal products of the iron mill, and with the normal products of the steel mill. These latter should include plates, shapes, bars, pipe, sheets, tin plates and wire. Inasmuch as many steel producing interests fabricate steel, an allowance for such work should be made, while as to wire, it is the rule for the wire mill to finish into plain wire, barb wire, wire nails and wire fence.

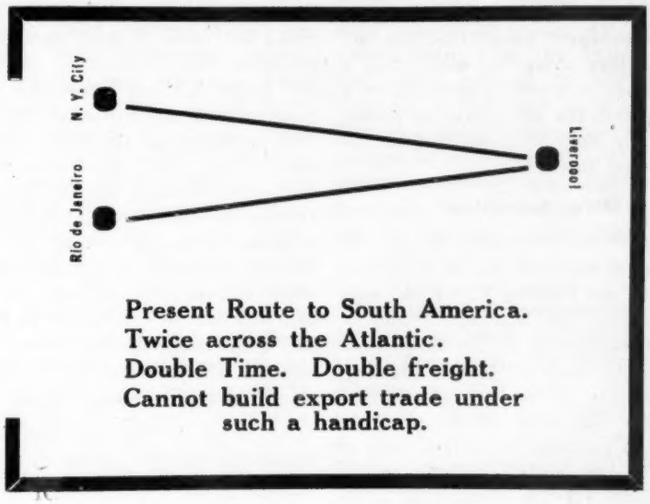
Complete statistics for the 1908 production are not available, and in any event it is more interesting to make the computation for 1907, with its maximum production and relatively high prices. For that year, a rough computation would place the value of rolled steel products, in the form in which they left the steel mills, as rails, plates and shapes (a portion of this fabricated), pipe, sheets, tin plates and wire products, at about $800,000,000. The product of the iron mills, including both mills which puddle iron and mills which simply reroll old material, and including such finished products as are turned out by iron mills, would amount to about $100,000,000. The product of steel castings would be valued at about $40,000,000, while the output of all grades of pig iron passing to the foundry would total, at the point of manufacture, about $125,000,000. This would give a grand total of $1,065,000,000 as the value of the output of the iron and steel industry proper, taking the 1907 product and the prices realized therefor at the point of manufacture. While the estimate is necessarily rough, there is practically no question that the output, as thus defined, exceeded $1,000,000,000 in actual realized value, and it may have exceeded $1,100,000,000.

Other great industries make a comparatively modest showing. Even the great coal industry in 1907 produced according to the geological survey, only $615,000,000, valued at the mine, and a considerable part of this output simply went to the iron and steel industry. The value of crude petroleum was $120,000,000. Of course the coal had a much higher value at the point of consumption, and the oil was much more valuable after it was refined for use, but the iron and steel industry can claim still greater augmentation of value for its products than can these industries. The great bulk of the billion dollars' worth of material produced by the iron and steel industry was greatly enhanced in value before it was put into actual use. The foundry iron was converted into castings, the merchant mill products, sheets and tin plates, were cut up and otherwise fabricated, the plain wire was converted into finely finished product, such simple articles as wire clips selling at more than a dollar a pound to the final consumer and so on. If the actual value at final point of consumption of the entire product of the iron and steel industry could be computed it would probably be found to exceed two billion or three billion dollars in a year like 1907.

THE RIGHT KIND OF ENTHUSIASM.

A striking example of enthusiasm for the upbuilding of the merchant marine is furnished by the Ward-

Dickey Steel Co., of Indiana Harbor, Ind., which is now devoting a considerable part of its advertising space in a number of periodicals, to arguments in favor of the merchant marine. For example, in a recent advertisement the following appears:


N. Y. City
Rio de Janeiro
Liverpool
Present Route to South America.
Twice across the Atlantic.
Double Time. Double freight.
Cannot build export trade under such a handicap.

When a business concern is willing to pay its money and devote a part of its advertising space to the merchant marine, it is setting an example which might well be followed by thousands of other manufacturers who, in common with all the people of the United States, would be benefited by the restoration of the merchant marine to the place which it ought to hold in the commerce of the world.

ENTERTAINMENT FEATURES OF THE A. S. M. E. CONVENTIONS.

Machinery for June.

A delightful feature of the semi-annual conventions of the American Society of Mechanical Engineers is the various excursions to points of interest in and about the cities where the conventions are held. The parties going on these excursions are given special attention, and unusual courtesies often are extended in honor of the society. To the ladies and other guests of the members such excursions are particularly enjoyable because of their novelty, and we fear that the majority of the members are more interested in them than in the regular proceedings.

Notwithstanding the popularity of such diversions, we are inclined to question the advisability of featuring them to the extent that has been the case in the last few years. It seems that the prestige of the society will suffer if the entertainment side of the convention is magnified so that it eclipses the technical side. We believe that the society will gain in prestige if less attention is given to pleasure, and more to the real business for which the conventions are intended. Let the spring conventions be held in places where ample hotel accommodations are provided, but where the outside attractions are minimized. Then the attention of the visiting members will be centered on the papers and discussions. The chief value of the conventions lies in the oral and written discussion of the papers, and in the making of acquaintances and the renewal of friendly relations. If the discussions fail, there is comparatively little profit in traveling hundreds of miles to hear papers read, as every member receives the monthly journal of the society containing them. Let us continue to have entertainments, by all means; but let them be subordinate to the real business of the society.

RECEIVERS FOR WESTERN FOUNDRY SUPPLY CO.

James Berry and Drury W. Cooper have been appointed receivers of the Western Foundry Supply Co., offices of which are at 50 Church street, New York City. The company was incorporated July 1, 1908, with capital stock of $500,000. Its last financial statement showed assets several times in excess of liabilities, and it is anticipated that a reorganization will be possible. A notice issued by the receivers to stockholders and creditors states that the action taken was considered "the logical means of meeting the financial condition of the company in order to conserve the interests of the creditors. It would appear that there is a large amount of raw and finished material on hand and that the immediate embarrassment of the company was brought about by the prevailing condition in the iron and steel trade and the inability of the company to realize on the material." The company's principal line of product was ground alloys for the foundry trade. The receivers are continuing the business and are accepting orders for early shipment.

The American Steel & Wire Co. blew in No. 2 blast furnace at Donora, Pa., May 9.

CLOSER RELATIONSHIP

Of Manufacturer and Jobber Promulgated by Hardware Men's Convention.

An important convention of the year will be that of the American Hardware Manufacturers' Association and the Southern Hardware Jobbers' Association to be held jointly at Pittsburg, June 9, 10 and 11 under the auspices of the Pittsburg membership of both organizations. The convention will discuss matters of immediate importance to the hardware and jobbing interests of the country, and the list of speakers and special papers is imposing. There will be more than 500 persons in attendance, the southern representation being especially strong. One of the purposes of the joint convention is to bring manufacturer and jobber into closer relationship, and one of the first effects will undoubtedly be manifested in renewed activity in all lines of hardware manufacture.

The great manufacturing industries of Pittsburg district are taking the liveliest interest in the convention, and will assist in every way to make it a notable occasion, as much of the raw materials consumed in the hardware trade are turned out in Pittsburg mills. On the Pittsburg entertainment committee are A. C. Dinkey, president of the Carnegie Steel Co.; B. F. Jones Jr., president of the Jones & Laughlin Steel Co.; Wallace H. Rowe, president of the Pittsburg Steel Co.; Lawrence Dilworth, president of Dilworth, Porter & Co., and the general officers of a half dozen other steel and iron companies.

Among the entertainment features of the convention will be smokers, dances, musicales, banquets, trolley trips around the principal steel and iron works, and special entertainments such as teas, band concerts and receptions for the wives of delegates to the convention. It will be an occasion of special interest to the southern hardware men and their friends, as the convention is planned especially for them, and every form of hospitality is being devised with their comfort and entertainment in view.

At the annual meeting of the Orient Coke Co., Uniontown, Pa., the following officers were elected: President, Julian Kennedy; vice president, Robert Bentley; secretary and treasurer, Reid Kennedy; assistant secretary and treasurer, R. M. Frey; general manager, O. W. Kennedy.

NO REASON FOR RETARDING BUSINESS

IMPORTANT FEATURES OF THE TARIFF BILL WELL DEFINED,

And Radical Reductions Are Not at All Probable—Debate Will Continue for Weeks—Some Features of the Metal Schedule Still Unsettled

Washington, D. C., June 1.—The most interesting fact regarding the tariff revision situation in congress during the past week was the development of what seems to be almost certain indications that the session wil drag along well into July before the bill is finally completed and signed by President Taft.

This is not encouraging information for the industries of the United States, but it should be accompanied by the fact, which now seems settled, so far as the opinions of representative men in both houses of congress can make it, that business men in all sections of the country need not delay engaging in business extension and the carrying out of plans for enlarged operations because of any serious doubt as to what the general policy of the tariff law will be. The rates of duty to be established are expected to be on a medium line between the senate bill rates and the house bill rates. Perhaps they will be slightly lower than the senate bill rates, but more nearly approaching the averages of that bill than of the house bill. There will be some reductions in the rates of the senate bill, but not upon the basic items such as the raw materials which the house bill placed upon the free list. The senate has set itself squarely against that policy in the votes taken upon iron ore and lumber, and is expected to clinch the matter with the votes to be cast upon hides and coal. Democratic senators, a majority of them, lined up with a majority of the Republican senators in making certain that taxed materials shall be continued in the bill. They fixed this policy by the votes on all the schedules thus far touched, containing materials which enter into manufactures.

The Most Hopeful Fact.

It would appear, therefore, that the general indications of a resumption of operations in the metal trades, including the restoration of wage rates throughout this and other industries, should not be retarded by any lingering doubts regarding what the tariff will be. This is the most hopeful fact in connection with the long drawn out and wearisome tariff discussion. It is important to keep the fact in mind, however, with the prospect ahead that the debate will drag along for more than a month, when it was first assumed very generally that the bill would be passed and on the statute books before the first day of July.

Metal Schedules.

In regard to the remaining features of the metal schedule still to be passed upon, they are hanging in the air, with no conclusion yet reached by the finance committee as to the disposition that shall be made of them. Pig iron and scrap iron rates, duties to be carried upon the ferro-alloys, and the changes to be made in certain lines of wire and wire nails, continue to afford trouble for the committee. The matter has come to be so much confused as a result of the delay and the conflicting representations of the Steel Corporation and the independents, that it is mere conjecture what the rates to be finally agreed upon will be. Doubless many of them must be left to be settled in the conference between the two houses. That this will be the course, probably depends upon how much time is given by the senate to debate upon the remaining schedules and the administrative sections of the bill.

Pig Iron Duty.

All indications still point to the retention of the pig iron rates at $2.50. It also appears probable that the scrap iron rate will be left at a duty corresponding precisely with the pig rate, although some independents are making vigorous efforts to secure a reduction. It is claimed that the Steel Corporation has so strong a hold upon the situation that its friends will be able to retain the duties on scrap at the pig iron figures. The finance committee members are in doubt about the wisdom of this course, and are inclined to favor the claims of the independents that there should be a lower rate on scrap. So hotly is the contest waged that it may be necessary to settle the matter in conference. If anybody can find out what the committee intends to do with the ferro-alloys or what changes are to be made in the items covering wire and wire nails, he will confer a favor upon some members of the committee itself. The demand for rates of duty upon the ferro-alloys above the rates imposed by the house bill has upset the calculations of the committee in the senate. The producers of the steel into which these alloys pass objected strongly to the rates imposed by the house bill. Instead of relief from these rates, the tendency seems to be favorable to still further advances, which are urged by western senators, and may be carried into the bill by the votes of the senate, if the matter is not turned entirely over to the conference committees.

Some Troubles Ahead.

So much controversy has been engendered by the sugar and lumber schedules that Chairman Aldrich has not found it convenient to turn back to secure a completion of the metal schedule. More troubles will be found in the schedules soon to come up covering woolen and cotton goods. With the pending income tax issue, which has been postponed until June 10, and may still be further postponed, it manifestly is the desire of Chairman Aldrich to get as much as possible of each schedule completed before a showing is demanded upon the question of the revenues to be raised by the bill. If that shall prove to be the situation as the days pass, Mr. Aldrich will be less inclined to attempt a final settlement of the disputed question in the metal schedule.

ARTHUR J. DODGE.

Coke Holdings Sold.—The Soisson interests of Connellsville, Pa., have disposed of their holdings in the coke plant of the Rocks Coal & Coke Co. to Francis Rocks, of Masontown, Pa., and Thos. J. Lynch, of Uniontown, Pa. The plant, which is located at Lynn Station on Redstone branch of the Pennsylvania Railroad Co., was erected about five years ago by Mr. Rocks, who later sold a half interest in it to the Soissons. The works consist of 143 ovens, and it is the intention of the new owners to erect 58 additional ovens.

The Pennsylvania Steel Co. lighted its three furnaces at Steelton, May 4. The Emporium Iron Co. banked its Emporium, Pa., furnace May 1, and it was out the entire month.

STRIKE ON LAKES

Accompanied by Many Brawls, but Plenty of Vessels in Commission.

Of the list of vessels enrolled in the Lake Carriers' Association, 235, or approximately half of the fleet, are now in commission. They are being operated under the vicissitudes incidental to a strike. Minor brawls are frequent at Lake Erie ports, especially at Cleveland, and the police force are constantly on guard. Letters have also been received by certain chief engineers of lake steamers advising them to quit their positions and threatening the annihilation of their families if they do not. Some of the vessel owners are employing vigorous means to stop this form of intimidation and have offered a reward of $1,000 for information that will lead to the arrest and conviction of the persons responsible for the letters. It is probably true that the Marine Engineers' Beneficial Association frowns upon tactics of this sort, but they seem to be inseparable from strikes—an unruly element in no way concerned in the issue takes advantage of the situation to provoke disturbances. It is also likely that the individual engineers would prefer to be at work and would, if permitted by their association, gladly sign individual contracts with the vessel owners. Privately they have had all they want of union firemen. In fact, if the engineers were let alone by the association officials, they would work hand and glove with the master and owner to remedy the situation which has existed on shipboard during the past few years. There is no question of wages involved.

Dock managers do not think that any sympathetic strike on the part of the longshoremen will seriously interfere with the unloading of vessels. The leading unloading plants will not be affected and vessels can be cared for as they arrive. There are quite a number of vessels now at Lake Erie ports and as some of the upper docks worked on Monday the lower docks will be quite busy all week working out the vessels already in and taking care of those that come.

The Lake Carriers' Association in Cleveland has opened shipping offices opposite the Rockefeller building, as some of the sailors were unwilling to present themselves at the offices on the river front owing to the boisterous element continually about them.

Attempt to Arbitrate Fails.

The board of arbitration of the great lakes states, assisted by Seth Low, president of the National Civic Federation, came to Cleveland in an endeavor to bring about a settlement of the controversy. None of the vessel owners would go to the hotel to meet with them, however, and so the members went to the vessel owners in Pickands, Mather & Co.'s office. Harry Coulby, president of the Pittsburg Steamship Co., quickly convinced them that the vessel owners had really nothing to arbitrate, the principle of the open shop being fundamental and therefore not subject to change or amendment. All that the vessel owners are asking is the right to employ the men they please regardless of the fact whether they belong to the union or not.

Magazines Consolidated.—*Profitable Advertising,* which for 18 years has been devoted to the promotion of advertising, and *Sales Management,* an ably edited publication devoted to the theory and practice of marketing the products of mill and factory, have been consolidated under the name of *Advertising and Selling,* with Geo. French as editor and A. Eugene Bowles as general manager.

New Can Company.—Articles of incorporation have been filed at Albany, N. Y., for the Ross Can Co., of America, with an authorized capital of $1,000,000 in shares of a par value of $100 each, the principal office to be at Glen Cove, L. I. The directors named were Henry Admunds, of Westminster, Eng.; J. K. Clark, A. R. Bremer and J. C. Bowers, of New York; H. O. Patterson and F. L. Gross, of Brooklyn, and A. F. Furst, of Cedarhurst.

Damaged by Fire.—The No. 9 cotton tie plant of the Painter mill of the Carnegie Steel Co. on the south side, Pittsburg, was seriously damaged by fire, May 29. The blaze originated in a tar vat and practically destroyed the wooden structure.

Companies Consolidate.—A consolidation has been effected by the Bruce-Meriam-Abbott Co. and the Macbeth Iron Co., both of Cleveland, under the name of Bruce-Macbeth Engine Co.

The Carlisle Frog & Switch Works, the leading works of Carlisle, Pa., were destroyed by an incendiary fire on the morning of May 29. The loss is $150,000, covered by insurance. John Hays is president of the company.

STEEL CAR COMPANIES

Report Improvement — Great Activity of the Republic Iron & Steel Co.

(Special Telegram.)

Pittsburg, June 2.—The Republic Iron & Steel Co. this week fired its Republic coke plant of 400 ovens at Republic Station, Pa., and will put in other ovens as fast as possible. The company is running all of its nine blast furnaces, its steel works full, and has all its iron mills going, with the exception of Toledo, Alabama and Gate City.

The National Tube Co. will probably start some of its pipe furnaces at the Riverside works next week.

The steel car companies report a marked improvement in their market and are looking for a heavy fall business.

A lot of 400 tons of malleable for June shipment was closed this week at $14.75 furnace.

The Best Mfg. Co., Pittsburg, has been awarded the contract for furnishing the piping equipment and valves of the new electric power plant at the Gary works of the Indiana Steel Co. and will also supply similar equipment for the blowing engine house and boiler house, for the battery of four blast furnaces, Nos. 5 to 8. An additional order placed by the company calls for the copper and bronze material for the cooling apparatus for the blast furnaces.

DETROIT WAGE CONFERENCE ADJOURNED WITHOUT AGREEMENT.

The representatives of the Western Bar Iron Association and the Amalgamated Association of Iron, Steel and Tin Workers, who had been in conference at Detroit for a consideration of the annual iron mill wage scales, adjourned May 29 without having reached an agreement. Preliminary arrangements were made for a second conference, to be summoned at the call of either party, but no date for this meeting has yet been fixed.

The bar iron manufacturers had originally asked a 10 per cent reduction in the wage scales, but, it is understood, a modification of this request was made at the Detroit conference, so that a cut of smaller percentage is now proposed. The Amalgamated Association at its annual convention adopted the expiring scale as representing the views of the men. The present wage agreement expires June 30.

The $3.75 per ton rate has been given to the puddlers in the mills at Pottstown, Pa.

ANNUAL MEETING OF THE AMERICAN SOCIETY FOR TESTING MATERIALS.

The twelfth annual meeting of the American Society for Testing Materials will be held at Atlantic City June 29 to July 3. The features of the program of special interest to readers of THE IRON TRADE REVIEW are as follows:

Tuesday, June 29, 8 p. m.

Annual Address by the President: Engineering Responsiblity.

Notes on Tests of Ingots and Derivative Shapes in Progress at Watertown Arsenal, Mass. J. E. Howard.

The Closing Up of Blowholes in Steel Ingots. H. M. Howe.

Further Investigation of Broken Steel Rails. Henry Fay and R. W. G. Wint.

An Investigation of a Defective Open-Hearth Steel Rail. Robert Job.

Wednesday, June 30, 10 a. m.

Report of Committee A—On Standard Specifications for Iron and Steel. W. R. Webster, Chairman.

Report of Committee R—On Uniform Specifications for Boilers. E. D. Meier, Chairman.

Report of Committee M—On Standard Specifications for Staybolt Iron. H. V. Wille, Chairman.

Report of Committee F—On Heat Treatment of Iron and Steel. H. M. Howe, Chairman.

Some Notes on the Heat Treatment of Steel. William Campbell.

Detailed Fractures of Cold-Rolled Rails at Low Temperatures. P. H. Dudley.

Elongation and Ductility Tests of Rail Sections Under the Manufacturers' Standard Drop-Testing Machine. P. H. Dudley.

Dark Carbon Streaks in Segregated Metal of "Split Heads" of Rails. P. H. Dudley.

Wednesday, June 30, 8 p. m.

Measurement of Impact Stresses. B. W. Dunn.

The Testing of Galvanized and Other Zinc-Coated Iron. W. H. Walker.

Tests of Standard and Bethlehem I Beams and Bethlehem Girders. Edgar Marburg.

The Permanent Mold and Its Effect on Cast Iron. E. A. Custer.

Thursday, July 1, 10 a. m.

Report of Committee U—On the Corrosion of Iron and Steel. A. S. Cushman, Chairman.

Notes on Corrosion Tests of Iron and Steel. R. B. Carnahan, Jr.

Notes on Tests of Steel Columns in Progress at Watertown Arsenal, Mass. J. E. Howard.

The Physical Quality of Steel Which Has Been Subjected to Compression During Solidification. Bradley Stoughton.

Discussion to be opened by Henry M. Howe and J. E. Howard.

Report of Committee V—On Standard Specifications for Cold-Drawn Steel. C. E. Skinner, Chairman.

An Interesting Driving-Axle Failure. M. H. Wickhorst.

Friday, July 2, 10 a. m.

Report of Committee E—On Preservative Coatings for Iron and Steel. S. S. Voorhees, Chairman.

Principal Features of a 1,200,000-pound Testing Machine with Special Reference to a New System of Transmitting the Pressure Developed in the Hydraulic Cylinder to the Scale Beam. T. Y. Olsen.

A Machine of New Design for Hardness Tests. T. Y. Olsen.

Notes on the Bearing Value of Rods Imbedded in Concrete. R. A. Cummings.

Saturday, July 3, 10 a. m.

Report of Committee B—On Standard Specifications for Cast Iron and Finished Castings. Walter Wood, Chairman.

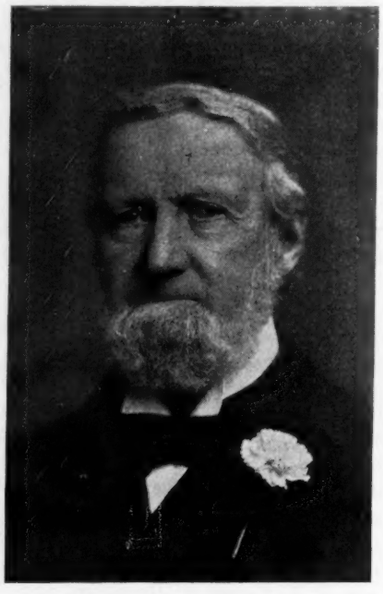
Report of Committee K—On Standard Methods of Testing. Gaetano Lanza, Chairman.

The Effect of Tension on the Shearing Strength of Rivet Steel. E. L. Hancock.

The Structural Material Testing Laboratories, U. S. Geological Survey: Progress during the year ending June 30, 1909. R. L. Humphrey.

OBITUARY.

N. P. Bowler, for many years prominently identified with the industrial and commercial life of Cleveland, died May 28, at Pasadena, Cal. Born in Carlisle, N. Y., in 1820, Mr. Bowler removed to Cleveland in 1839, and served for some years as an editorial writer, and in the organization of the old Cleveland Board of Trade, now the Chamber of Commerce. In 1863, Mr. Bowler engaged in the foundry business, and retained his interests in that industry all his life. He was vice president of the Bowler Foundry Co., president of the Cleveland Frog & Crossing Co., vice president and treasurer of the Cleveland Steel Casting Co.; was identified with the Bruce-Meriam-Abbott Co., the Forest City Paint & Varnish Co., and



NATHANIEL P. BOWLER.

a number of other leading Cleveland business enterprises. He was a member of the American Society of Mining Engineers, and served as trustee of the Cleveland Water Works for a number of years. He is survived by two sons, William L. and Walter N. Bowler, and one daughter.

O. L. Hurlbut, secretary of the Roane Iron Co., of Chattanooga, Tenn., died at his home in Chattanooga, May 31, after a lingering illness. Mr. Hurlbut was connected with the Roane Iron Co. for more than 20 years. He was popular and was held in high esteem as a capable officer of the company with which he was so long identified.

Edmund A. Thompson, vice president of the John Thompson & Sons Mfg. Co., Beloit, Wis., recently died at the age of 43 years of Bright's disease. Mr. Thompson was a son of John Thompson, a pioneer manufacturer of Beloit.

PERSONAL.

Elbert H. Gary has been elected a director of the Astor Trust Co., New York.

Vice President J. V. W. Reynders, of the Pennsylvania Steel Co., and his family, will spend a short time abroad this summer.

Brooks J. Goodin has been appointed resident manager of Matthew Addy & Co. at Pittsburg, with offices at 1501-2 Farmers' National Bank building.

Andrew D. Chidsey, of Easton, Pa., has been elected to succeed the late Joseph S. Rodenbaugh, of that city, as a director of the Thomas Iron Co.

J. B. Sharp, Chemical building, St. Louis, Mo., also representing Worth Bros., has been appointed general southwestern agent for the Champion Rivet Co., Cleveland, O.

Eaton, Rhodes & Co. have appointed Joseph G. Walton as their representative in Pittsburg territory and will open an office in Pittsburg in the near future. Mr. Walton left Walter, Wallingford & Co. on June 1 to accept his new position.

James E. Hubbard, manager of sales of the Republic Iron & Steel Co. at St. Louis, resigned, effective June 1, and has been succeeded by George F. Alderdice, who has been assistant in the office of the general manager of sales of the company at Pittsburg.

C. A. Strom has appointed general manager of the Rogers plant of the American Locomotive Co., Paterson, N. J., Frederick S. Cook, who has been manager of both plants of this company in Paterson, and will continue in charge of the Cooke plant.

Wm. Kent has resigned as general manager of the Sandusky Foundry & Machine Co., Sandusky, O., and disposed of his interest. Dr. Kent will maintain his residence in Sandusky for the summer and has under way a revision of the well known "Kent's Hand Book," which has already passed through seven editions.

Lawrence Fagan, owner of the Fagan Iron Works, Hoboken, N. J., was the purchaser of the Passaic Steel Co., Paterson, N. J., at the receivers' sale May 28, paying $190,000 for the properties, on which there were mortgages aggregating $2,500,000. The upset price established for the sale was $150,000.

AMONG MACHINERY MAKERS.

CINCINNATI.

Machine Tool Trade Improves—Efforts in Behalf of Apprentices.

Office of THE IRON TRADE REVIEW,
First National Bank Bldg., June 1.

The month of May has shown an improvement in the machine tool trade as compared with April and the demand for machine tools appears to be steadily increasing. Early in the month, dealers reported the outlook less encouraging than for a long time, but at the close correspondence is much heavier, there is more inquiry, and sales have in the aggregate shown an increase over the preceding month. The demand is better for the smaller types of machines than for the heavier lines. Small drills have sold very well and the smaller sizes of lathes have moved better.

Shop activities are increasing and the Lodge & Shipley Machine Tool Co., the American Tool Works Co., the John B. Morris Foundry Co., the J. A. Fay & Egan Co., and some others are now working full time. Secretary Manley, of the Cincinnati Metal Trades Association, and in charge of the employment bureau for the association, says that figures for May will show a perceptible increase in the working forces employed in the shops.

Evidences of a betterment in general conditions are being reflected in the demand for machine tools and the outlook for a continued gradual increase in demand as reported by manufacturers of machinery is encouraging.

Efforts to arrange for educational advantages for apprentices in the shops of the machine tool makers are taking form and a number of manufacturers in this line have addressed the superintendent of public schools of Cincinnati a strong letter requesting that classes be established, especially adapted to shop apprentices, teaching such subjects as shop mathematics, mechanical drawing, etc. The manufacturers consider this training of such importance that they have agreed on their part to guarantee enough boys for at least one teacher, and to send their apprentice boys to school one-half day each week, and as an inducement to attend the school they agree to pay the apprentices regular wages during the periods of instruction.

The Swing Electric Co., with a capital of $60,000, has been incorporated to take over the assets of the old Barriett Electric Co., which were sold at receiver's sale about a month ago. The incorporators are Richard C. and G. F. Swing, Charles J. Yates, A. C. Isham and E. C. Kirkpatrick. It is expected that Philip Swing, who was receiver of the Barriett company, will head the new company.

The J. H. Day Co., of Cincinnati, has restored all cuts in wages during the past month. The cuts were made over a year ago during the worst period of the depression.

The Cincinnati Pulley Machinery Co. has enjoyed an exceptionally good demand for sensitive drills during the past month and has a lot of 50 coming through ready for shipment at once and all sold.

MILWAUKEE.

Large Orders Are Coming Out—Jobbers Asking More Time.

Milwaukee, Wis., May 31.—The past week has been one of increased activity. The demand for steel seems to have been revived by the threats of higher prices and many of the jobbers are now asking for more time to fill orders. Machinery lines are showing improvement and larger and more frequent orders are being received.

Last month the Allis-Chalmers Co. booked more orders than for any month for two years, and indications are that the present month will be even more satisfactory. Among the orders received of late calling for all types of prime movers, transformers, motors and electric generators, representing a total capacity of 161,985 horsepower was an order placed by The Milwaukee Electric Railway & Light Co. for two 1,500 kilowatt motor generator sets, one 500 kilowatt balancer, six 2,000 kilowatt transformers, two 300 kilowatt transformers, two 300 kilowatt motor generator sets and a 300 kilowatt generator of the water-wheel type.

"The spread of our business westward has induced us to bring our convention into this territory," said one of the delegates to the recent tool builders' convention. "We appreciate the growth of Milwaukee and the consumption of our products here has been very encouraging."

The Stevens Mfg. Co. at Marinette, Wis., is completing plans for adding several new machines to its output, principally in the agricultural implement line. A new line of sugar beet machinery will also be manufactured.

Work has been started at the plant of the Allis-Chalmers Co., West Allis, on the construction of the big pumps for the North Point pumping station in Milwaukee and it is expected that several months will be required to finish the job.

The Wisconsin Bridge & Iron Co., of Milwaukee, has received an order from the Chicago, Milwauke & St. Paul Railway for 900 tons of structural steel for bridge building. It is understood that the American Bridge Co. received an order from the road for 675 tons.

Piggins Bros., of Racine, Wis., have received a big run of orders of late for the Piggins gasoline automobile engine, a specialty with the company. The company not long ago received an order for 500 engines.

WORCESTER.

New England Builders Find Business on the Mend.

Worcester, Mass., May 31.—The Putnam Machine Co., the Fitchburg Machine Works and the Simonds Mfg. Co., all of Fitchburg, report business on the mend, but they are not operating yet at capacity.

The following directors of the Waltham Watch Co., Waltham, Mass., were re-elected at a meeting last week: Ezra C. Fitch, Francis R. Appleton, J. W. Appleton, I. Tucker Burr, Conover Fitch, Edward A. March, W. L. Putnam, H. P. Robbins, R. C. Robbins and Augustus K. Sloan. Royal Robbins and Philip W. Carter were re-elected treasurer and clerk respectively.

The manufacturing plant of the Bullard Automatic Wrench Co., East Providence, R. I., was sold at mortgagee's sale May 26. The property consisted of buildings, land, power plant and machinery.

The Frazer Machine & Mfg. Co., Boston, has assigned for the benefit of creditors.

The American Specialty Co., Bridgeport, Conn., has changed its name to the American Novelty Co. It manufactures specialties in wire goods and hardware.

The Graton & Knight Mfg. Co., manufacturer of belting, has awarded the contract for a new factory addition. It will be of brick, four stories high, 75 x 252 feet.

The City Mfg. Co., New Bedford, will build a new machine shop, 54 x 72 feet, one and one-half stories high.

The Winchester Repeating Arms Co., New Haven, has awarded the contract for the erection of two large buildings with connecting corridors.

These buildings are to be of reinforced concrete throughout with large window area.

The Scovill Mfg. Co. is enlarging its plant. One addition will be one-story brick, 120 x 140 feet; another will be a two-story brick, 40 x 72.

The following Connecticut concerns are also enlarging: M. Backes & Sons, Inc., Wallingford, makers of percussion caps and toys; The Lockwood Mfg. Co., South Norwalk, maker of builders hardware; The C. J. Root Co., Bristol, maker of brass goods.

SAN FRANCISCO

Exposition Will Be Held—Heavy Demands for Machinery.

San Francisco, May 28.—San Francisco is to have an exposition of machinery, commencing Monday, June 19, and continuing one week. The National Association of Stationary Engineers will hold its annual convention in this city commencing June 14 and to continue three days. The machinery exposition will be held in the Auditorium, and will be open day and evening, while the convention will hold its sessions in the Auditorium Annex, situated under the same roof. This will be the first mechanical exposition held in San Francisco for some years, and is bound to attract many persons interested in machinery.

Manufacturers, dealers and agents of manufacturers have contributed most generously toward that exhibit, and the managers of the affair predict that it will be one of the most interesting and instructive exhibitions held. Of the available floor space in the exposition hall, fully 15,000 square feet have been reserved, and the rest will be assigned before the time for opening the show arrives. Some noted engineers, scientists and professors of colleges will deliver lectures during the exposition, in the Annex, which will be open to the public.

Francis P. Bergen, one of the advisory engineers of the Civic League of California, is about to start on a tour of the United States on behalf of the league, to study the water supply systems throughout the country, that he may gather knowledge to assist San Francisco in installing its proposed water system.

In his travels he will visit Cleveland and almost every large city and manufacturing center in the United States. He will include in his itinerary the towns in which turbines, pipe and other parts of San Francisco's future water system are being made.

The following are a few of the factors which create work for manufacturers of machinery: The recent discoveries of rich placers in many sections of the Pacific slope, and the development of electric power which has given impetus to dredging, requiring machinery. An electric power plant has been financed by the leading men of Hawthorne, Nevada. A site and a chain of lakes has been secured near Mono Lake, Cal., and the plant will have a waterfall of 1,700 feet, developing power to supply all the mining camps, dredgers and quartz mills for many miles. Work is to be commenced at once. A powerful dredging company will commence operations near Austin, Nev., and will develop the rich placer diggings along Reese river and its tributaries. Rich discoveries in placer have also been made recently along the creeks in that section of western Nevada. The only thing for developing those placers, power, was lacking, but it is ample now. Dredging is to be commenced on the Manhattan properties within a few days. The machinery is on the spot and is being rapidly installed. Recent finds in the Indiana Ranch mine, Yuba county, Cal., have revived interest in gold mining in that once famous section, and dredging and quartz mining have been resumed with renewed vigor and much better facilities than ever, by the aid of improved machinery.

The construction of the railroad to Eureka, Humboldt bay, at a cost of $8,000,000, and the proposed pipe line for the oil companies from the oil fields to the coast, at a cost of fully $3,000,000, and a few other important enterprises, will furnish work for some foundries and machine shops for some time to come.

PITTSBURG.

More Decided Improvement—Advance in Price of Boring Mills.

Office of THE IRON TRADE REVIEW,
510 Park Bldg., June 1.

Improvement in the machinery market in the Pittsburg district has become more marked during the past month, and the large builders are daily receiving an increased volume of orders. The better conditions are especially manifest in steel works and finishing mill machinery. Such prominent interests as the Mesta Machine Co., United Engineering & Foundry Co., Mackintosh, Hemphill & Co., and others, have been booking some important contracts lately and have been adding to their active operations. Some makers of chilled rolls have entered an encouraging aggregate of orders. Drafting forces generally are very busy, as there is a large amount of work undergoing estimating.

The machine tool trade in this district shows evidences of a turn toward improved conditions. Inquiries are heavier, although there are no especially large deals under negotiation and sales are more numerous. A recent purchase in this territory was a 90-inch boring mill by a large machinery manufacturer. Machine tool builders are showing the effect of the better trade outlook and have announced an advance of approximately 10 per cent in the prices of medium sized boring mills which will become effective July 1.

Work is now being actively pushed upon the construction of the four blast furnaces which the Jones & Laughlin Steel Co. is building at Aliquippa, Pa., to supply metal for its extensive steel works and finishing mills planned for that point. When orders were issued about a month ago for contracts to be carried out in this construction, the furnaces were in a partially completed state, as little work had been done upon them during the past 18 months, by reason of the prevailing business conditions. The building is now to be pushed, and it is expected that three of the furnaces will be ready for the air about Nov. 1 while the remaining stack will be completed at a later date. In connection with the blast furnaces, the erection of ore handling plants and auxiliary equipment is being carried out. The construction of the Aliquippa steel works and finishing mills will provide heavy machinery makers with a notable opportunity for business, as only a few of these contracts, including the blooming mill, heavy duty engines, etc., have been placed. One of the finishing mills projected, a tin plate plant, is now being figured on by machinery builders.

Conditions with the Westinghouse companies continue to show substantial improvement. At the present time, the volume of orders being received by the Westinghouse Electric & Mfg. Co. shows an increase of 100 per cent over the same period one year ago. The company is now proceeding with the building of 24 double-unit electric locomotives for the Pennsylvania railroad's New York terminal improvement. These machines will represent the highest type of development in electric locomotives and will be able to attain a speed of 90 miles an hour. They will be manufactured from the design of George Gibbs, chief of electric traction of the Pennsylvania railroad. The mechanical parts

will be turned out at the railroad company's Altoona shops and the electrical apparatus at the Westinghouse Electric's East Pittsburg plant. These locomotives represent the initial order on the general electrification contract awarded the Westinghouse Electric & Mfg. Co. for the Pennsylvania's New York terminals and tunnels from Hackensack, N. J., to Long Island. They will be completed by fall. There is increased activity in the buying of electric mine locomotives by coal companies, and orders of this nature to the Westinghouse Electric & Mfg. Co. have averaged one machine a day for the past month. The Westinghouse Machine Co. has just closed a contract to furnish a 250-horsepower gas producer plant with gas engine to the Spencer Wire Co., Boston. The operations of the Westinghouse Airbrake Co. and the Union Switch & Signal Co. are at a very favorable gait as the railroads are buying the products of these companies quite freely.

In connection with the construction of a large gas line from the West Virginia fields to Cincinnati and other Ohio points, figures have been taken by the Corcoran Construction Co., Pittsburg, for the mechanical equipment to be installed in the central pumping station. Five gas engines of 1,500 horsepower each will be used to drive an equal number of air compressors of 16½ x 60 inches stroke. In addition, four gas engines of 160 horsepower each will be required for the lighting plant. Machinery makers have entered bids on all this equipment. Delivery is specified at Kenova, W. Va.

N. C. Davison & Co., Keenan building, Pittsburg, report the closing of a contract with Biggin & Son, Sharon, Pa., for an 18-ton Larsen-Baker refrigerating plant which will be operated by a 40-horsepower gas engine.

The McKeesport Tin Plate Co., McKeesport, Pa., is planning a material extension of its present capacity. Ten additional hot mills are to be installed which will make the works a 20-mill plant. The company expects to start construction about July 1 and to have the mills ready for operation about Jan. 1.

The production of pig iron in Germany in April was 1,047,197 tons, compared with 1,073,116 tons in March and 979,866 tons the corresponding month last year. The four months' total this year has been 4,091,601 tons, an increase over that for the corresponding period last year of 9,222 tons.

MACHINE TOOL BUILDERS MEETING AT MILWAUKEE.

The seventh semi-annual convention of the National Machine Tool Builders' Association was held Tuesday and Wednesday, May 25 and 26, at the Plankinton House in Milwaukee. These half yearly meetings are gatherings chiefly for committee work and to the work of the several standing and special committees the greater portion of the time at Milwaukee was given. The representation was not as large as might be hoped for, about 55 out of a possible 100 attending. The machine tool builders from the east were notably in the minority and the meeting was largely representative of the territory west of Cincinnati and including that city.

The morning session on Tuesday began with the disposal of routine reports and matters, President F. L. Eberhardt of Newark, N. J., presiding, and included the presentation and discussion of freight charges, uniform cost accounting, the apprenticeship system, topics pertaining to the foundry and other subjects of general interest in connection with the relations of the tool builders to their customers and agents. A paper on "Competition" by Murray Shipley of the Lodge & Shipley Machine Tool Co. was presented. The afternoon was given entirely to committee meetings during which consideration was given to technical matters pertaining to lathes, planers, shapers, upright drills, radial drills, sensitive drills, milling machines, boring machines, gear cutting machines and all geared head lathes.

At the third and last session on Wednesday morning, various committee reports were read and a general discussion developed, particularly with regard to the tariff and the action taken by the association in support of machine tool builders' welfare. A paper on "Machine Tools for Railroad Shops" was read by William Forsyth, M. E., editor of the *Railway Age-Gazette*. The gist of Mr. Forsyth's paper was pointing out indications of a growing tendency in railroad shops to introduce economical methods and economical machine tools as compared with former practices. He enumerated as instances of improvements, new railroad shops such as those of the Grand Trunk at Grand Rapids, Mich., and the splendid shops of the Delaware, Lackawanna & Western now building in the east, and purchases of new tools by other roads. He showed also the kind and number of the various tools required for the above railroad shops. He presented briefly the proposition of determining the general efficiency and capacity of a machine tool on the basis of tonnage of metal machined and offered certain data in illustration. The convention was adjourned until the annual meeting at New York in October.

In the afternoon, a party of about 35 was conducted on a trip through the shops of Kearney & Trecker, builders of the "Milwaukee" milling machine, and through the plant of the Allis-Chalmers Co. On Wednesday evening, a party of those in attendance at the convention proceeded on a week's fishing trip as the guests of A. M. Marshall of the Marshall & Huschart Machinery Co. to his summer home at Shore Acres, Wis. The gentlemen of the party included See Wood Walters, treasurer of the Cincinnati Milling Machine Co., B. B. Quillen, president of the Cincinnati Planer Co.; Samuel H. Reck, president of the Rockford Drilling Machine Co.; D. R. Oliver Meckel, manager of the Baird Machine Tool Co.; William Reid, secretary of the Marshall & Huschart Machinery Co., and Mr. Marshall.

Vanadium Steel for Tools.—Four years ago, vanadium was hardly known outside the laboratory and its great cost restricted its use, although its value as an alloy for steel was well known; but since the discovery of extensive deposits in South America, its use has rapidly extended and it is now freely adopted wherever steel of the highest quality is required. An account of some remarkable results in fine tools, for woodworking and other purposes, has been sent us by the American Vanadium Co., Pittsburg, to which inquiries should be addressed.

Four-Furnace Plant.—The new tube mill which the Hazelton Steel Tube Co., a subsidiary of the Republic Iron & Steel Co., will erect at Youngstown, O., will be a four-furnace plant. Two of the furnaces will be lap-weld and two butt-weld and will produce tubular goods up to 12 inches in diameter. None of the contracts for the new mill has yet been placed but it is expected that definite steps will shortly be taken.

A special general stockholders' meeting of the Lake Superior Corporation will be held June 9 at Camden, N. J.

AMAZING PROSPERITY OF AUTOMOBILE BUILDERS

BUSY ERECTING OR PROJECTING BIGGER SHOPS AND MORE EQUIPMENT

Unparalleled Activity Continued Unflaggingly Throughout Business Depression — Extraordinary Conditions as Revealed in Interesting Series of Letters From the Manufacturers Themselves

The extraordinarily flourishing condition of the automobile industry, particularly its unflagging continuance throughout the past 18 months of industrial depression, has been the source of constant wonderment upon the part of the iron and steel manufacturers as well as the general public. Throughout a period extending over many months, when blast furnaces were being blown out and rolling mills and steel plants closed down, plants in which automobiles are manufactured were forced to run at capacity to keep up with the insistent demand for their product—many of them in the depth of the depression being compelled to work their employes in night and day shifts. A number of them, as far back as a year ago, were vainly endeavoring to rent or lease some of the otherwise idle machine shops, not daring to take the time necessary to build greatly needed additions to their own shops.

Realizing the intimate relations of automobile manufacture to the general iron and steel trade, THE IRON TRADE REVIEW recently addressed a letter to a number of the leading automobile manufacturers of the country, in the endeavor to obtain accurate information as to the present conditions and, as far as these manufacturers could see ahead, the future prospects of the business. Each was asked as to what additions he had recently built to his manufacturing plant, or expected to build in the near future; what equipment he had recently installed and whether he would be in the market in the near future for further equipment; and as to how he found business at the present time as well as what, in his opinion, the prospects were for the remainder of the present year. A great many replies to this letter are at hand and a number of them are printed herewith as they were received, and a number more will be printed in THE IRON TRADE REVIEW of next week:

Commercial Truck Co. of America.

The Commercial Truck Co. of America, Philadelphia, while having made some slight additions to its plant recently, is just now getting its equipment, purchased before the business depression, back to its capacity again. It says:

"We find the prospects for business, at the present time, somewhat better than actual orders which we are booking, but we are doing sufficient business to keep going, with the outlook of our plant working up to its full capacity in a short time."

Reliance Motor Truck Co.

The Reliance Motor Truck Co., Owosso, Mich., advises that about Jan. 1 it moved into its new manufacturing plant which has about double the capacity of the old. The building is 65 x 500 feet, with single steel truss roof and concrete floor. This plant is used exclusively for the manufacture of 3-ton gasoline motor trucks. It is not in the market for further machinery equipment, having recently added several of the latest types of machines suitable for its use. It further advises:

"Business is very good with us at the present time, having all that we can take care of, and wishing we had more room that we might work a larger force. Prospects for the remainder of the year are very bright for business."

The Pierce-Arrow Motor Car Co.

The Pierce-Arrow Motor Car Co., Buffalo, has begun work on the erection of two additions to its plant, made necessary by its constantly increasing business. The first addition is to machinery hall, 50 x 201 feet, one story; the other, a three-story addition, 60 x 75 feet, to the body building, the added floor space of both buildings being 34,500 square feet, thus bringing that of the total plant up to 395,880 square feet. It will not be in the market in the near future for new equipment. Further the company says:

"Business, so far as we are concerned, is in an ideal condition; all specifications for every car we could manufacture in the 1909 season being entered on our books some months ago. Recently our larger dealers have been visiting the factory and without a single exception they have been anxious to contract for cars for 1910 at least 50 per cent in excess of the number they bought for 1909."

The Hendee Mfg. Co., Inc.

The Hendee Mfg. Co., Inc., Springfield, Mass., Indian motor cycles, reports that in the past few months a considerable number of new machine tools have been added to its equipment, including screw machines, drills, lathes, and small gear cutters. It has in course of erection an addition to its main building which will nearly double its capacity next season. Commenting upon the demand for motor cycles, it says:

"The demand for the Indian motocycle has been unprecedented, and has necessitated a double shift, operating some of the departments 24 hours a day, while all the other departments are running until 9 o'clock at night four evenings a week. The people of this country are just beginning to appreciate the motorcycle and another year will see them almost as numerous as the automobile. In the course of evolution the riders have learned by practical demonstrations and experience that the American-made Indian motorcycle is superior to any foreign machine, and as a result foreign makes have never secured a foothold in this country."

York Motor Car Co., Inc.

The York Motor Car Co., York, Pa., advises that since August it has increased its floor space to 85,000 feet, and this month it was necessary to hire additional floor space of 13,000 square feet. The company has been in the automobile business since 1903, but during the last six months has purchased $50,000 worth of additional machinery, and shortly will need some more machinery. In regard to business conditions, the company says:

"The business with us at present is very good, and we expect to still increase during the present year, in fact we are oversold."

Premier Motor Mfg. Co.

The Premier Motor Mfg. Co., Indianapolis, Ind., maker of Premier motor cars, states that it will add about 50 per cent to its factory this year, but that it does not contemplate

making its own bodies. The company further says:

"We have not been able to take on any new business for three months, and the outlook for 1909 seems promising."

The Sellers Motor Car Co., Inc.

The Sellers Motor Car Co., Inc., Hutchinson, Kas., which has moved the plant of the St. Joe Motor Car Co., of Elkhart, Ind., to Hutchinson, where it is now operating under the name of the Sellers company, is now occupying a new factory building with a little over 20,000 square feet of floor space. It will need no additional equipment at this time. As to prospects, it says:

"Business at present is fine and the outlook for the remainder of the year could not be better. We are not able to supply the demand they are making of us for cars."

The American Motor Truck Co.

The American Motor Truck Co., Lockport, N. Y., commercial automobiles, has not as yet made any additions to its buildings but expects to do so early next year. It has recently installed the Fellows gear shaper and No. 4 American miller and contemplates the addition of 50 per cent to its plant equipment for 1910, saying:

"We find business at the present time excellent and no prospects of its letting up."

The Mitchell Motor Car Co.

The Mitchell Motor Car Co., Racine, Wis., is at present making these additions to its factory; a new office building, three-story, 110 x 120 feet; a factory building, 230 x 240 feet; a new power house, 60 x 100 feet; and another factory building 250 x 420 feet. It is constantly installing new equipment for the manufacture of cars and is buying from a great many machinery makers and jobbers. Further it advises:

"Business was never better and the demand for cars so great."

The Garrett Machine Works Co.

The Garrett Machine Works Co., Garrett, Ind., the Garrett gas engine and auto buggies, has recently moved into a new brick building giving it over 16,000 square feet of floor space. It expects soon to install a milling machine, gear cutter and other new equipment. At to the prospects for business it says:

"We are very busy at present and the outlook bids fair to keep a like condition for the year entire."

Pickard Bros.

Pickard Bros., Brockton, Mass., automobiles, have not made any plant additions recently, but declare that they will have to do so, if business continues as at present. They have not installed any equipment lately, but will put in more machinery if they decide to increase their output. As to future business prospects they said:

"Business is rushing and the prospects for the remainder of the present year are very good."

The Sternberg Mfg. Co.

The Sternberg Mfg. Co., Milwaukee, advises that it has entered the field for the manufacture of motor trucks in these sizes: 1,000 pounds, 2,000 pounds and 3 tons. It is exceptionally busy and is arranging for new and larger factory buildings, but up to this time has not definitely decided just where it will locate. Further it says:

"Business is exceptionally good with us at this time."

The Waverly Co.

The Waverly Co., Indianapolis, electric carriages, trucks, etc., has made no additions to the Waverly plant since it purchased the present plant from the Pope Mfg. Co., last fall. However, it is introducing new equipment frequently from time to time. It advises as follows as to prospects:

"Business at the present time is very good. A large part of our factory is running night and day to keep up with the orders and we are at present planning to double our output for the coming year."

The Bartholomew Co., Inc.

The Bartholomew Co., Inc., Peoria, Ill., Glide automobiles, has virtually closed contracts calling for doubling the capacity of its factory, and will be in the market this summer for a quantity of machine tool equipment for delivery in the fall. Further it advises:

"Our business at the present time is very good and has been good all this year. Our sales for the first four months of this year exceed those of last year by 125 per cent, and we have sufficient orders on hand to keep our factory going at full time for six months. In addition to the domestic orders, we have considerable quantity of automobiles to make for shipment to South America and foreign points."

The Couple-Gear Freight-Wheel Co.

The Couple-Gear Freight-Wheel Co., Grand Rapids, Mich., manufacturer of "couple-gear" trucks, does not contemplate additional building or further machinery equipment at present. It advises:

"Business with us is very good and prospects for the remainder of the year were never better."

Kearns Motor Buggy Co.

The Kearns Motor Buggy Co., Beavertown, Pa., has just completed an addition to its factory three stories, 40 x 60 feet, in which it will make the hoods, fenders, etc., for its cars. It has not recently installed any machinery, having two years ago equipped its plant with every machine necessary to make the complete car. Too, it adds:

"As for business, we wish to candidly state that we are rushed, and since the first of the year have been working day and night."

S. R. Bailey & Co., Inc.

S. R. Bailey & Co., Inc., Amesbury, Mass., manufacturers of carriages and electric vehicles, state that they have not made and do not expect to make any additions to their plant, which is among the largest and most perfectly equipped in the country in the carriage trade, and that they have not recently installed any equipment. The company has been manufacturing an electric car for four years, and speaking of business conditions, says:

"Business in the electric automobile line is particularly good just at present and prospects are very promising. The use of the electric carriage in and about cities is becoming rapidly recognized and we are anticipating a time when they will predominate in the city streets."

Merkel-Light Motor Co.

The Merkel-Light Motor Co., Pottstown, Pa., motorcycles, which was organized last November, has found its present facilities sufficient for immediate needs, but has been compelled to run both day and night for the past several months. It has added a Milwaukee milling machine, a Heald internal grinder, a Brainard-Becker gear cutter and several minor special tools. It adds:

"We are pleased to state that at the present time we have a very satisfactory amount of business booked and from the present indications the general demand for our motorcycles will continue throughout the regular season, which usually terminates during the latter part of October."

(To be Continued.)

IRON MANUFACTURING

May be More Extensively Developed in Mexico—Increasing Use of Steel.

City of Mexico, May 31.—Considerable interest is being taken in the prospects of developing an iron manufacturing business in the south of Mexico, a business which has not heretofore been considered practical because of the lack of a coal supply. The announcement of the successful coal explorations of the Oaxaca Coal & Iron Co., in the central part of Oaxaca, south of Mexico City, has revived the prospects of utilizing the large iron deposits found in the south of Mexico, some of them near the coal developments. A railroad project to tap the coal fields and then to reach the iron district and ultimately be extended to the Pacific is being financed in Europe and it is expected that work on it will be commenced at the close of the rainy season. Persons connected with the iron foundry business in St. Louis, Mo., are interested in another iron development in Oaxaca. The iron deposits lie southwest of the city of Oaxaca and are said to be extensive. They are now quite inaccessible, but a railroad projected by these interests will reach them and it is planned to engage in the making of charcoal iron and perhaps later to make iron and steel electrically, as there is abundant water power to be had. The company has a concession for the railroad, but has not yet made any direct move to realize the plans. Other railroads are projected in the south of Mexico which will make accessible the numerous iron deposits along the Pacific litoral in Oaxaca, Michoacan and Jalisco. It appears that the importance of these deposits has generally been greatly exaggerated by engineers and others who have made reports on them. However, they are large enough to form a basis for any local demands that are in sight for a generation or more.

Coal of a good quality has been discovered near Zautla in the state of Puebla, east of the City of Mexico, but the extent as so far proven is limited. The Oaxaca coal is found in the tertiary formations. All of the southern Mexico region is very much broken by the intense and continued tectonic action to which it has been subjected. This is the problem in the development of coal in the south of Mexico.

An extensive manganese deposit has been recently exploited south of the City of Mexico near the railroad to Cuernavaca, but so far there has not been found a market for the product. It runs 43 per cent manganese and is low in phosphorus and sulphur. The owners are offering to ship a thousand tons a month.

Steel Buildings.

Several steel structure buildings are under way or planned for Mexico City and it is likely that the use of modern construction will displace the heavy masonry of the ancients. Two new government buildings are being erected in front of the building of the department of Fomento displacing an old religious structure erected in 1600. The contrast of the light steel frames with the heavy walls, 7 to 10 feet thick, is noticeable. The steel buildings are of necessity light because of the soft foundations which are to be found throughout the site of Mexico City. Most of the steel for structural purposes used here has come from Europe. The $10,000,000 new National Theater is of steel from Germany.

Swedish steel for drills is largely used in Mexico. It is cheaper than American steel. French drill steel is in the market and also English. Most of the dealers carry stocks from several countries to meet the demands of the trade.

The Mexican Southern road from Puebla to Oaxaca is using steel ties of a inverted boat pattern, extensively. The road is owned by an English company.

The Interoceanic road between Mexico City and Vera Cruz uses old rails for telegraph poles.

The Pan-American road running from the Tehuantepec line along the coast to Guatemala has purchased several new engines and new cars for the increasing traffic which is being developed. It is owned by Los Angeles interests, but recently a deal for the transfer of the line to the same interests which control the United Fruit Co. in Central America has been under way. It is expected that the line will ultimately become part of the Harriman system forming a connecting link in a road to the Isthmus of Panama, extending from the present terminus of the Harriman line under construction at Guadalajara.

Iron Ore Deposits.

An investigation of the iron deposits tributary to the Pacific coast ports has been recently made in the interests of an American syndicate. Presumably the purpose is to ship this ore via the Panama canal to the Atlantic ports. Some time ago, the Japanese investigated the same region for the purpose of considering the possibilities of obtaining an ore supply for the Japanese iron industry.

A line projected into Lower California by the Harriman interests will reach the important iron deposits in Lower California which were a few years ago made the basis of the projected iron and steel plant at San Diego, Cal., which did not get beyond the newspaper stage. Some extensive high grade manganese deposits, belonging to a California company, are found on the gulf coast of Lower California, near Santa Rosalia, opposite Guaymas. A small shipment was made from these deposits to England.

A projected line of railroad from Monclova, Coah., to Chihuahua will make accessible several iron deposits in the central northern part of Mexico, which are reported to be of considerable extent. They are all located at a great distance from the present railroads. The new line will make them tributary to plants of the Monterey Iron & Steel Co., which is now receiving its supply chiefly from the Cerro de Mercado de Monclova, north of Monterey. It is reported that this deposit is changing into sulphide ore in depth, a characteristic feature of most of the Mexican iron deposits so far investigated.

The general trade conditions in Mexico are improving, but the volume of business continues small.

The Monterey Iron & Steel Co. is working full capacity on the large order for rails for the national railways. It is reported that the new management is making a very satisfactory product that comes up to the rigorous specifications in every respect.

The projected Monclova-Chihuahua road is likely to be built, according to good advices. It will tap a country in which there are several large iron deposits. T. S. Abbott, of Saltillo, Coah., is the engineer for the road. English capital is backing the project.

The Monterey Iron & Steel Co. has recently been receiving coke from England, via Tampico. Ordinarily most of the coke imported into Mexico comes from the United States. A low shipping rate is the occasion of this English consignment. A small tonnage of coke came from Germany a few years ago.

The plant and equipment of the Compania Nacional Inexuona de Fuerro y Acero at Durango, which has been operating on the Cerro de Mercado ores, is to be sold for the creditors. T. F. Artherbee has been working the plant with a force of about 200, but the high fuel cost has prevented a successful operation.

The Zenith Furnace Co. blew in its stack at Duluth May 7 after making repairs.

TITANIFEROUS MAGNETITES OF THE ADIRONDACKS MAY BE DEVELOPED.

Representatives of several blast furnace interests in the eastern district were present at a meeting held in New York last week for the consideration of developing the enormous deposits of titaniferous magnetites in the Adirondacks. The ruling prices on ores from the Lake Superior district, coupled with the heavy freight charges incident to the long rail haul, have given eastern furnaces a burden which averages so high in cost as to render operating in less active times an extremely hazardous proposition. Various efforts have been made and are still being made to cheapen this burden, notably through the extensive purchasing of ores from Newfoundland, Russia, Spain, and only recently from Sweden. The aggregate tonnage of ores from these foregoing deposits available for American purchase is never large, however, and the ocean freight situation is usually such as to render the transportation of any important tonnages so costly as to defeat the object of the movement. Merchant furnaces are not expecting any material assistance from the development of the various Cuban properties, as these deposits are controlled by steel-making interests and practically no ore will be imported beyond their own requirements. Facilities have recently been considerably increased at the mines of the principal producers of domestic ore throughout the eastern district and they are now in position to supply a considerable tonnage, but this is by no means adequate to meet the requirements of furnaces along the coast during normal times.

With this situation existing, eastern furnacemen are naturally interested in the development of any workable ore deposits of sufficient extent which are so located as to permit their delivery in furnace yards at a level below that now current on Lake Superior or foreign ores. It has been known for many years that the Lake Sanford district in the Adirondacks held an enormous deposit of titaniferous magnetite, on which some 55 years ago a charcoal furnace was operated for several months. Since that time the deposit has been practically without attention until some two years ago when drilling was begun on a scale sufficiently extensive to demonstrate its great tonnage. No effort has been made to gain an exact idea of the probable tonnage in sight. One large hill appears to be solid ore with only a slight overlay of forest earth. At the crest of this hill, a test hole was put down about 500 feet without striking the foot-wall and another hole in the adjacent valley went down over 100 feet with similar result. It is regarded as certain that this immediate deposit contains fully 100,000,000 tons, while the geologists' estimate runs in the neighborhood of 500,000,000. These properties can be worked as a quarry proposition and the nature of the ore is such as to render it well suited for concentrating.

The point of real interest in connection with these ores is whether or not their titanium content is such as to render them unsuited for smelting. The crude ore runs roughly about 50 per cent in iron and from 20 to 22 per cent TiO_2, but this will easily concentrate to from 58 to 60 per cent and during the operation the titanium content is reduced to 5 or 6 per cent, while the phosphorus will run 0.01 or under. One lot of several hundred tons of this crude Tahawus ore was recently gotten out and transported by wagon over the mountains to railroad connections. It was worked with very successful results by a Pennsylvania furnace. At the New York meeting, two or three other furnace managers reported that they had worked ores similar to these in titanium and had experienced no difficulties so long as sufficient lime was used for proper fluxing. It is probable that further tests will be made on this ore, and if these turn out as successfully as is anticipated, work will be begun immediately on facilities for developing the district.

The Tahawus district is so located that a railroad of about 50 miles in length will be required to connect with the Delaware & Hudson and the Rutland, near the lower end of Lake Champlain. At this point also connections will be secured with the 2,000-ton barge canal, by which very low freights will be available to the Buffalo district, to points along the Hudson and to New York, from which the rail rate to eastern Pennsylvania plants is small.

The Pressed Radiator Co. of America, manufacturer of Kinnear pressed radiators for steam and hot water heating, recently shipped to the Japanese government over 30,000 square feet of radiators, to be used in the marine hospital, erected at Osaka, which is the largest hospital ever built by the Japanese government.

THE SEVENTH INTERNATIONAL CONGRESS OF APPLIED CHEMISTRY.

(From our Special Correspondent.)

This congress is now meeting in London, Eng., and the proceedings will attract more than usual attention in the United States because President Taft has appointed the following seven chemists to represent the United States government at the gathering, and to invite the congress to hold its eighth meeting (in 1912) in the United States:—Dr. Harvey W. Wiley, chief chemist, department of agriculture; Prof. Charles Baskerville, City college; Dr. Leo Baekeland, chairman, American Chemical Society; W. L. Dudley, professor of chemistry, Vanderbilt university; Dr. W. H. Nichols, president of the General Chemical Co.; Prof. Morris Loeb, president of the Chemists' Club; Albert Plaub and Dr. Maximilian Toch. The invitation is likely to be accepted with much enthusiasm.

In our issues of Feb. 28 and March 4 we have already given much information concerning the organization of the congress, and its previous meetings in Brussels, Paris, Berlin, Vienna and Rome, and in our issue of April 1 we gave the titles and authors of papers—in Sections I, II, III and X, which promised to be of special interest to our readers.

At a meeting of the joint organizing committee of the congress held in London on May 12, it was reported that over 2,400 tickets had been issued up to date, and that large numbers of papers were being offered in nearly all the sections.

As regards the printing of papers, the executive committee has decided, after much consideration, that it will be most wise to print in advance abstracts only of the papers sent in. The committee proposes that an international committee of the congress shall be formed, for the purpose of considering which papers shall be included in the printed proceedings of the congress, and whether in extenso or in abstract. Those who have been members of the last two congresses will recognize the wisdom of this proposal, for the proceedings of the Berlin congress in 1903 filled four bulky volumes of over 1,000 pages each, while the Rome congress in 1906 beat this record, with seven volumes weighing over 40 pounds. The cost of printing and distributing this mass of printed matter to all the members is, of course, a very large item in the cost of the congress, and the reduction of the offi-

cial report to smaller dimensions is imperative if the congress is not to be crushed by the dead weight of its own proceedings.

The meetings of the congress are taking place in the buildings of the University of London at South Kensington, the only exception being the inaugural meeting which was held in the Royal Albert hall.

The Prince of Wales attended the opening ceremony, May 27, as representative of King Edward, and delivered an interesting speech on the relation betwen chemistry and modern industry.

SHORTER WORK DAY

Has Now Become Effective for San Francisco Metal Workers.

San Francisco, June 1.—The abbreviated work day today became effective for the men employed in the metal trades. According to an agreement entered into two years ago between the California Metal Trades Association and the Iron Trades Council, the hours of work in all affiliated trades are reduced from nine to eight, at the rate of 15 minutes at a time. The first reduction became effective six months ago, or 18 months after the agreement had been made. The second reduction became effective June 1, 1909. The curtailing of the work day has not produced any visible benefit upon the trade in this city, either for the wage earner or for the employer. There are not enough men employed in the iron trades, in a city in which so much structural iron and steel is being used, and there are too many molders, machinists and other artisans of the metal trades idle, in a city which is full of activity, but imports its fabricated steel and iron several thousand miles across the continent, or greater distances by sea, when its foundries and shops, better equipped than ever, work with half, or less than half, crews. Builders, contractors and architects assert that the eastern fabricators underbid local competitors, in spite of the added cost of freight, which is considerable of an item to the eastern bidder.

To the lowest and best bidder goes the work. There is no sentiment in plain dollars and cents transaction. If there be a tinge of sentiment, it is in favor of the home manufacturer. Facts are stubborn: Many men idle here, while the work goes east, and the money follows.

Articles of incorporation of the Pacific Coast Steel Co., with a capitalization of $1,000,000, were filed with the county clerk yesterday. Five shares of stock of a par value of $100 have been subscribed by the following directors, each of whom takes one: D. P. Doak of Los Angeles, F. M. Doak of Burlingame, S. C. Denson of San Francisco, L. A. Allyer of Berkeley and L. Macomber of San Francisco.

INCREASED ACTIVITY

In the Coke Regions and Prospect is for Continued Improvement.

Improved conditions with the steel companies are being reflected in the coke oven operations of the Connellsville region, where some notable additions to active capacities are being made. The report of Secretary Irvin, of the Coke Producers' Association, for the week ending May 25, is as follows:

The firing of 1,100 and odd ovens last week by the Frick Coke Co., was the feature of the week in the coke business. Shipments were 465 cars more from this district for Pittsburg and western points than the week before and an increase in number of days worked by ovens belonging to the furnace and independent interests indicates a marked improvement in the trade.

The Frick company worked five days, and the furnace and independent plants averaged a little more than 5½ days' work during the week. The Struthers Coal & Coke Co. had 40 ovens going at the end of the week and we were informed by its office that the entire plant of 200 ovens would be fired at once. The gain in active ovens by the other interests was 10 among the Rainey plants and 46 in the aggregate at the independent works. It is expected that a number of additional ovens will be put in during the present week.

Standing loads of coke today are reported as 749 cars, or 140 more than one week ago, at which time that was the smallest number during 12 months of which we have any record.

At this time, 63 per cent of the 37,631 ovens in the region are active. The Frick company has approximately 65 per cent in, ovens belonging to the furnace interests 51.7 per cent, and the independent concerns 61.7 per cent.

While there was little change in the blast furnace situation last week, the number of active furnaces was on the whole increased. In the Pittsburg district, 50 of the 61 furnaces are now in, one being added at the Edgar Thomson works of the Carnegie Steel Co., making all of the 11 furnaces in that group now going.

In the Mahoning and Shenango valleys, reports of operations of 41 furnaces show 26 in blast, a gain of one since our report of May 8.

In the Cleveland district, no change, five of the seven furnaces being in.

One furnace was put out by the Buffalo-Union Furnace Co., at West Seneca, N. Y.

The only changes noted in the Milwaukee district were two furnaces blown in by the Illinois Steel Co., at its South Chicago works, making eight of the group of 11 furnaces at that point now in blast.

Operators report stocks of coke on independent yards as being small. Consumers are hunting coke and prices offered by them, while much better than for a long time, are not being accepted with alacrity. Very few contracts are being made and those few but for small amounts and short periods.

Every sign points to a continued improvement in the coke business and producers will doubtless guard against an over production at this time.

CUSTOMS DECISIONS.

The United States circuit courts have made the following decisions:

(1). Ferro-chrome, ferro-tungsten, ferro-vanadium are dutiable at $4 per ton by similitude to ferro-manganese and ferro-silicon, under paragraph 122 of Dingley act, by virtue of section 7. Section 7 provides that, if imported merchandise be not enumerated in the act, it shall pay duty at the rate provided for goods it most resembles. The assessment, which was reversed, was 20 per cent under paragraph 183 for unwrought metals. The duty at 20 per cent would be $850 per ton on the vanadium, $450 on the tungsten and $160 on the chrome. The government announces that it will appeal from the decision.

(2). Steel horseshoe calks were held dutiable at 45 per cent under paragraph 193 and not a steel in forms and shapes under paragraph 135.

(3). Steel ball bearing parts of machinery were held dutiable at 45 per cent. The claim was as in the horseshoe calks case.

The United States circuit court, New York district, affirmed the assessment of the duty on window sashes by the New York collector. The sashes are complete, having steel sides, gun metal stays and handles. They were assessed at 45 per cent under paragraph 193 of present tariff law as "manufactured metal" and claimed dutiable as "shapes of iron or steel, punched and ready for use" at 5/10 of 1 cent per pound under paragraph 125. The unsuccessful litigant in the cases was Edward M. Ackerson, New York.

The G. R. Shepard Engineering & Construction Co., 444 Water street, New York, has had a petition in bankruptcy filed against it. The business was started in 1890 and was incorporated five years ago for $25,000.

THE PRODUCTION OF ELECTRIC STEEL

A Description of the Girod Electric Furnace—Properties of Steel Produced Electrically

By Jas. A. Seager.

It is interesting to learn that the commercial application of electro-metallurgical processes has been carried a step further by the introduction of a Girod electric steel furnace at the works of Messrs. Oehler & Co., Aarau, Switzerland. In view of the cheap supply of water power to be obtained in that locality, it is evident that such an installation will probably lead to the establishment of an iron and steel industry in Switzerland, which will prove a formidable competitor to the already existing industries in the regions where coal mines are found, and it may therefore be interesting to give a few particulars of the system of Paul Girod for the production of electric steel.

Our illustration, Fig. 1, shows the general appearance of such a furnace in operation and the section and plan shown in Fig. 2 give a more particular idea as to the construction of the furnace. The hearth consists of a circular or oblong cavity, in which the metal when molten reaches a height of from 10 to 12 inches; in the bath are introduced one or more electrodes of similar polarity, while soft steel pieces embedded in the hearth of the furnace and in direct contact with the molten metal form the negative electrode. The current passing through the upper electrode forms an arc with the bath, traverses this bath and passes out through the lower pole pieces. It is evident that the parts of these poles which are in direct contact with the bath will become molten at their upper ends but it has been proved by making tests of such pieces after several months' work, that the reduction in length is not more than 2 to 4 inches. The extreme lower end of the pole pieces are water cooled by means of a cavity about 6 inches deep in this portion of the furnace, which reduces the amount of fusion on the electrodes and keeps the lower lining of the furnace intact. Part of the electrode projects below the furnace frame and the current is led into the poles at this point. The Girod furnace can therefore be classed as a combination of arc and resistance furnace, inasmuch as the metallic mass interposes a resistance to the passage of its current, particularly at the outset of the operation. Current is passed through a cold charge of scrap and pig iron. Almost the whole of the potential difference at the terminals of the furnace is taken up by the large resistance of the charge and also by the small arcs between the adjacent pieces. This power of starting with a cold charge has been proved to be a considerable advantage of the Girod system over other electric furnaces and it is found to be splendidly adapted for the work of refining metal. Due to its great simplicity it offers great advantages over furnaces which have electrodes in series.

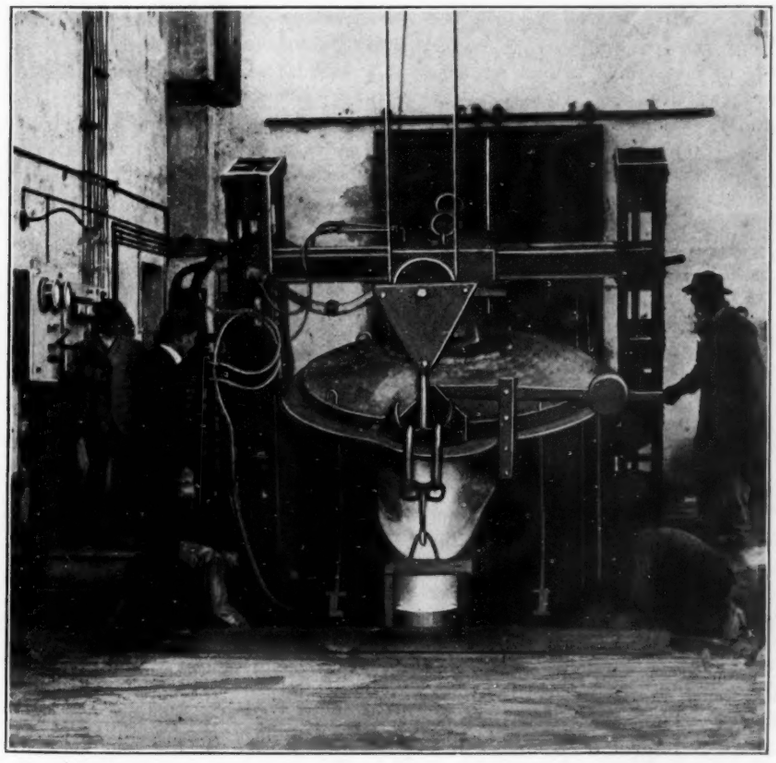


Fig. 1—Front View of Girod Electric Furnace, 4⅝ x 4⅛.

For example, there is only one step of potential to be regulated on the circuit instead of two successive steps and the arc can therefore be regulated automatically and easily. Insulation of the electric circuits and all parts traversed or likely to be traversed, is rendered easy by the fact that the voltage at which the furnace works (the furnace being adapted either for continuous or alternating currents) is comparatively low as contrasted with other electric furnaces. This has the advantage that safety to the life of unskilled workmen operating the furnace is also insured. On the other hand the low voltage of course involves an additional weight of copper in the main conductors, making the cost a little heavier for the same capacity than series furnaces; the factors of simplicity and safety, however, considerably counterbalance this.

The furnace is formed by a sheet steel frame work of circular or rectangular section, lined with some refactory material such as magnesia. The walls are provided with a charging and working door, and also with a tap hole and the steel is made to flow out by tipping the furnace, which is mounted either on pivots or on a cradle for this purpose. The roof of the furnace is made from silica bricks built round with cast iron pieces for an internal water circulation, through which passes the electrodes. These are adjusted in such a way that the

air cannot make its way into the furnace; as there are no electrodes of different polarity, no short circuit through the cover is to be apprehended and the use of cast iron parts is therefore rendered possible.

The furnace has a considerable range and can be used for making steels of all descriptions; carbon steels from the mildest to the hardest quality and special steels of every variety, whether for tools or structural purposes, can be turned out, so that the electric furnace covers the range of operations both of the crucible furnace and the Siemens' furnace. Moreover the product is of great purity and homogeneity, and as the work is done in a completely closed furnace there is no occlusion of gases in the metal. The use of highly basic refining slags, imparting briskness and intensity to the reactions, is rendered possible by the very high temperature of the electric arc, and the chemical equilibium between the slag and molten metal is considerably in favor of the purification of the bath. The metal is fined by adding a sufficient amount of iron ore to obtain an extremely soft metal, the maximum composition being carbon 0.075, silicon 0.05 and manganese 0.05. The oxidizing slags are then replaced by highly calcareous slags, which rapidly eliminate phosphorus and tend to refine the metal of sulphur; the mild and pure metal thus obtained is then given suitable additions to bring it to the required degree of quality involving the deoxidization of the bath and its recarburization. Ferro-silicon, silicon-manganese, ferro-chrome, ferro-tungsten or nickel are then added to obtain steel of desired composition. Desulphurization occurs particularly in the last stage when the slags are practically free from the oxides of iron and manganese.

The production of steel by the Girod furnace involves the consumption of 800 to 900 kilowatt hours per ton of steel produced, or allowing for 10 per cent loss in the conductors, the average energy consumption is about 1,000 units per ton to produce a steel of high quality from unsorted iron and steel scrap of the cheapest kind. Where it is only necessary to smelt a charge of a given composition in the same way as in a crucible furnace, the consumption varies between 650 and 750 units per ton, but against this saving has to be placed the extra cost of raw materials. Should liquid steel from a Siemens-Martin or Bessemer furnace be run into the electric furnace, about 350

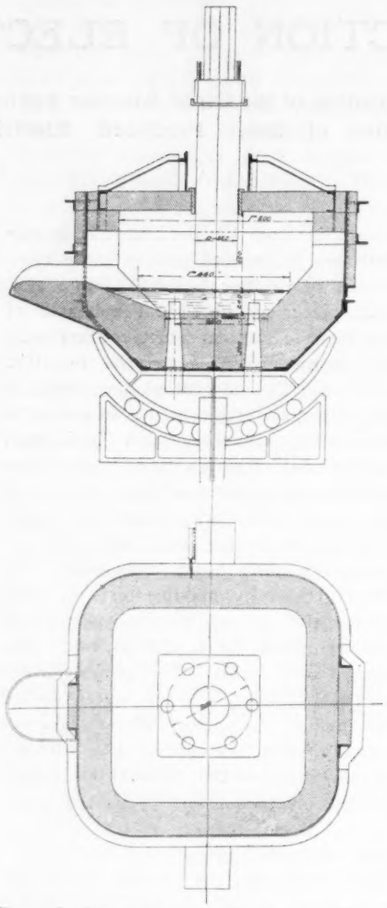


FIG. 2—SECTION AND PLAN OF GIROD FURNACE, 2½ x 5½.

units of electric energy per ton are used for refining and give the exact quality of metal in a furnace of 4,000 pounds capacity, such as used at the Ugine Works, and this consumption may be diminished to about 250 or 300 kilowatt-hours according to the capacity of the furnace and the nature of the product to be refined and obtained. The staff necessary to manage a 3-ton furnace, is a melter, an assistant, and a boy, and the cost of electrodes when starting with scrap as raw material amounts to about five francs ($1) per ton of steel produced. The plant installed at the works of Messrs. Oehler is of 300 kilowatt capacity, dealing with two tons of scrap at a charge, and Fig. 3 gives an excellent idea of the front view, corresponding to the general illustration in Fig. 1.

Certain data concerning the average qualities of steel produced by the Ugine furnace may be given. Tensile tests were taken on bars of 13.8 mm. (0.54 inch) in diameter, having a length of 100 mm. (3.9 inch) between the marks. Impact or resilience tests were carried out on a Guillery machine on square section bars of 10 mm. (0.39 inch) wide, having one notch 2 mm. (0.06 inch) wide by 2 mm. deep. Table 1 gives the figures obtained:

TABLE I.

Treatment.	Elastic limit, lbs. per sq. in.	Maximum stress, lbs. per sq. in.	E'ongation, per cent.	Contraction, per cent.	Resilience, pounds.
Annealed at 900° C.	39,241	50,485	33	73	1,034
Hardened at 800° C. and tempered at 600° C.	41,887	63,051	28	75	1,100

The furnace is largely used for the manufacture of case-hardening steels as the action of air is avoided and a sound non-oxidized metal can be cast without having recourse to excessive additions of manganese and silicon. After case-hardening, therefore, the central part remains highly fibrous and the very hard surface has no tendency to splinter. In contrast with ordinary case-hardening steels an impression with the Brinnell ball 10 mm. in diameter with a pressure of 3,000 kilogrammes, shows no crack on the edges. Cementation is carried out by using ordinary means, a mixture of say 40 per cent of barium carbonate and 60 per cent charcoal producing a case-hardened layer 1 mm. (0.039 inch) thick after heating for about 1½ hours at 900° C.

TABLE II.

Treatment.	Elastic limit, lbs. per sq. in.	Maximum stress, lbs. per sq. in.	Elongation, per cent.	Contraction, per cent.	Resilience, pounds.
Soft Steel.					
Ann'led at 900° C.	41,887	58,862	31	60	94.6
Hard'ned at 800° C. and temp'd at 600° C.	64,374	76,940	22	74	105.6
Medium Soft Steel.					
Ann'led at 900° C.	44,753	71,429	29	60	72.6
Hard'ned at 800 C. and temp'd at 600° C.	41,005	86,861	21	66	77.0
Medium Hard Steel.					
Ann'led at 900° C.	57,319	92,372	21	34	26.4
Hard'ned at 800° C. and temp'd at 600° C.	91,049	113,316	14	37	35.2
Hard Steel.					
Ann'led at 900° C.	60,185	97,884	17.5	30	19.8
Hard'ned at 750° C. and temp'd at 600° C.	114,859	137,126	9	30	26.4
Very Hard Steel.					
Ann'led at 800° C.	65,917	113,316	16	30.5	19.8
Hard'ned at 750° C. and temp'd at 600° C.	111,993	142,858	9.5	49	26.4

Table 2 shows the characteristic features of carbon steel made by the

Girod process and the high limits of elasticity and the good figures for resilience will be noted. Silico-manganese steel is also made in varying degrees of hardness, the two types most in demand for shafts, gearings, springs, etc., having when annealed at 900 degrees Cent., an elastic limit of 91,050 to 92,370 pounds per square inch, a maximum stress of 128,750 to 129,630 pounds per square inch, a percentage of elongation of 15 to 18, a percentage contraction of 25 to 29 and a resilience of 24.4 to 30.8 pounds. When hardened at 800 degrees Cent., and tempered at 450 degrees Cent., the elastic limit ranges from 150,000 to 182,000 pounds per square inch,

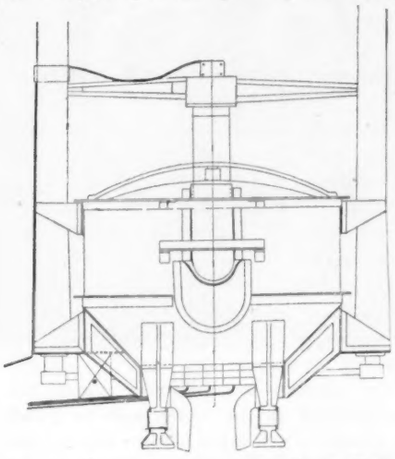


FIG. 3—FRONT ELEVATION OF GIROD FURNACE, 2¼ x 2⅜.

the maximum stress being 167,990 to 212,743 pounds, the percentage elongation and contraction being respectively 6.5 to 8 and 32, and the resilience varying between 13.2 and 26.4 pounds.

Nickel steels can also be made containing from 2 to 32 per cent of nickel in all degrees of hardness.

TABLE III.

Treatment.	Elastic limit, lbs. per sq. in.	Maximum stress, lbs. per sq. in.	Elongation, per cent.	Contraction, per cent.	Resilience, pounds.
(1) Air Hardened at 850° C., tempered at 600° C. and cooled very slowly in furnace	114,859	121,693	15	55	46.2
(2) Air Hardened at 860° C., and tempered at 400° C.	160,935	167,990	11	48	33.0
(3) Air hardened at 850° C.	216,932	231,042	8	38	22.0

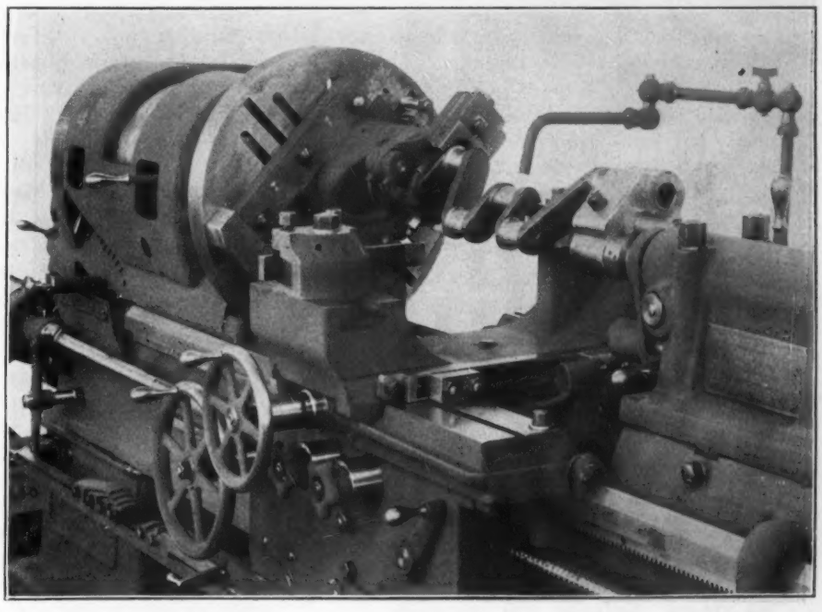
Nickel chrome steels of various grades, including those suitable for case-hardening are also produced in this furnace and a special steel known as "K. N. A." has remarkable qualities, as shown in Table III, and is of value by reason of the ease with which castings may be treated before use. After treatment by air hardening at 850 degrees Cent., the teeth of gears acquire great hardness, involving remarkably little wear.

A CRANK SHAFT TURNING LATHE.

The Lodge & Shipley Machine Tool Co., of Cincinnati, O., has designed a new attachment for their standard 22 inch x 12 foot patented head quick change gear lathe for rapid turning of small crank shafts. This attachment is quickly adjusted for all required changes of centers. It affords a powerful drive and most important of all, the design is such that the crank is rigidly supported and its tendency to spring under rapid cuts is largely overcome, so that the output, as compared with usual practice, is said to be considerably improved.

Positive stops are provided for reproducing diameters; the longitudinal stop at front of bed accurately controls length of tool travel, and other stops locate the several carriage positions for turning. The face plate drive consists of a sliding chuck mounted upon the face plate, adjustable for all required distances from centers, and held positively in position by a locating pin. The crank to be turned is gripped in a bearing having a hinged cap and is driven by a jaw against the cheek of the crank. The tailstock chuck is carried by a tapered bearing upon a plug arbor inserted into the bore of tail spindle and thrust collars are provided, with a suitable locking device, for preventing any possible binding on the taper bearing. The chuck proper is a solid block of steel bored for three bearings, the two end bearings being bronze bushed and may be used selectively. The central bearing carries the crank shaft which is to be turned, the crank being held fixed in position in the chuck by means of a clamping plug.

Bolted to the front face of tailstock is a bracket that is centered accurately by means of a hub encircling tailstock spindle. A locating pin carried in a long bearing of this bracket serves to align the crank in tailstock chuck with the face plate drive. A convenient method is provided for withdrawing this locating pin after having set the crank shaft, leaving the chuck free to revolve upon the plug arbor. The arbor and centering pin are made of tool steel and are hardened and ground. The tool block construction is of such character as to give the needed support to both cutting tools. The illustration plainly shows the vertical rib extending nearly the full length of each tool, affording solid support almost to the very point of the tool. The front and rear tool blocks are cast as one piece with the long slide that is mounted upon bridge of carriage. The slide has power and hand movement. The rear tool block carries two cutting tools which are set at proper distances for filleting out the corners of the crank. The front tool removes the remainder of the metal and the pin is then ready for finishing upon the grinder.



LODGE & SHIPLEY CRANK SHAFT TURNING LATHE.

A NEW TYPE OF STIFF-LEG DERRICK.

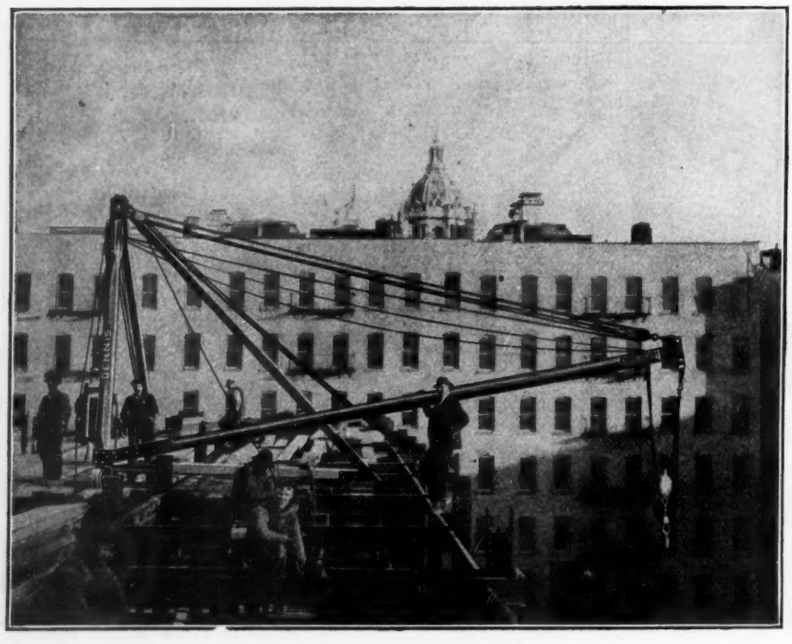
The accompanying illustration shows a new type of stiff-leg derrick especially adapted for setting iron work. For stone setters' use the derrick is similarly constructed with the exception that the mast is made of steel channels, allowing the hoisting crab to be located on the long stiff leg.

The short stiff leg and sill are hinged to the top and bottom gudgeons, allowing them to swing through the long stiff leg and sill so that the derrick can be made either right or left hand or collapsed in order to pass through a narrow space, when changing position. Change from right to left hand can easily be accomplished in about 10 minutes. The long sill is fitted with a broad flanged wheel at each end allowing the derrick to be rolled easily from one position to another.

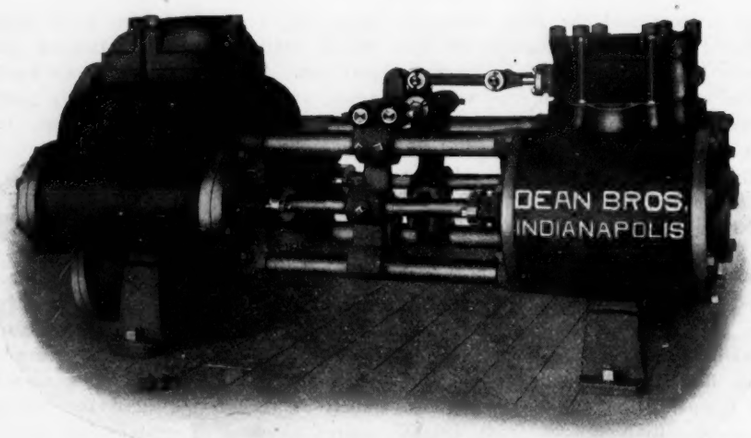
The stone setters' derrick is made up with short mast, so that it can be used between floors of buildings. It is claimed that the iron workers' derrick has been found to do from 40 to 75 per cent more and the stone setters' derrick from 50 to 100 per cent more than the usual Ginnywink and breast derricks, which they are designed to replace. They are entirely self-supporting with the exception, of course, that it is necessary to use guys when shifting position.

The cost of the derrick is but little greater than that of an ordinary stiff leg derrick, and enables the contractor to do fully 50 per cent more work.

The derrick is manufactured by the New Jersey Foundry & Machine Co., 90 West street, New York city.



New Jersey Foundry & Machine Co.'s Stiff-Leg Derrick.



Dean Bros. Duplex Piston Pump.

DEAN BROS. DUPLEX PISTON PUMP.

The illustration shows a new pattern of duplex pump brought out by Dean Bros. Steam Pump Works, Indianapolis, Ind. The steam valve gear is of their latest type with both levers alike. The frames are of heavy polished steel rods making a very rigid, strong construction. The pump throughout is of stocky build for heavy pressure and severe service. The suction and delivery pipes are connected at the outer end of pump cylinder. All the water valves are accessible by removing the water chest cover and valve plate. All bolts and stud nuts can be removed with an ordinary monkey wrench, special wrenches being unnecessary. The pump is of the regular inside packed piston type, but a plunger type is also made. It is intended for working pressures up to 150 pounds per square inch, but is tested at the works to 400 pounds per square inch.

The Baldwin Locomotive Works, Philadelphia, will shortly be chartered with a nominal initial capital stock, which will be increased later, the application for the charter to be made to Governor Stuart about June 1. Heretofore the works have been conducted by the firm of Burnham, Williams & Co., an unlimited partnership including George Burnham, John H. Converse, William L. Austin, Samuel M. Vauclain and Alba B. Johnson. The works were started originally in 1832.

Building New Plant.—Preliminary construction work upon the proposed sheet and tin plate plant to be erected by the Phillips Sheet & Tin Plate Co., at Hollidays' Cove, W. Va., is proceeding rapidly. Excavating for the plant is well under way and railroad sidings have been completed to the site. The contract for furnishing and erecting the 800 tons of steel work which the buildings will require has just been let to the American Bridge Co. It is expected that the plant will be on a producing basis by the end of the present year.

The Muirkirk furnace at Muirkirk, Md., was blown in May 22 by Ellery F. Coffin & Co. It is now working in good condition, turning out high grade charcoal iron.

A Swedish Puddling Furnace.

MAKING IRON IN SWEDEN

Interesting Description of Early and Modern Practice

By A. F. Backlin.

Many centuries ago, while the people of Sweden existed entirely by hunting, fishing and warfare, large sections of the country were barren and uninhabited, and the rich treasures buried in the ground were never dreamed of. Although the exact date of the beginning of the Swedish iron industry is lost in the mists of antiquity, we do know that the Stora Kopparbergs Bergslag Co. was organized between the years of 1200 and 1250, for the purpose of operating mines, at first to produce copper only. There are records showing that the celebrated Dannemora mines were operated as early as 1480.

The year 1400 marks the real beginning of the Swedish iron industry, and the history of the blast furnace is really the history of their iron. In 1406 a crude blast furnace, made up of timber, clay and fireproof material, was erected. Blast was furnished by means of ordinary blacksmith bellows, actuated by a waterwheel. Thirty years later, ten furnaces were working, and through the energetic efforts and personal interest of such monarchs as Gustavus I, Charles IX, and Gustavus Adolphus, who fully appreciated the great value of the iron deposits nature had bestowed on their country, Sweden soon took a leading place in this industry. Gustavus I personally owned and operated the Finspong's Works and blast furnace, and in 1555, made cannon for the first time from cast iron. These old predecessors had a capacity of about 1,200 pounds of iron per 24 hours.

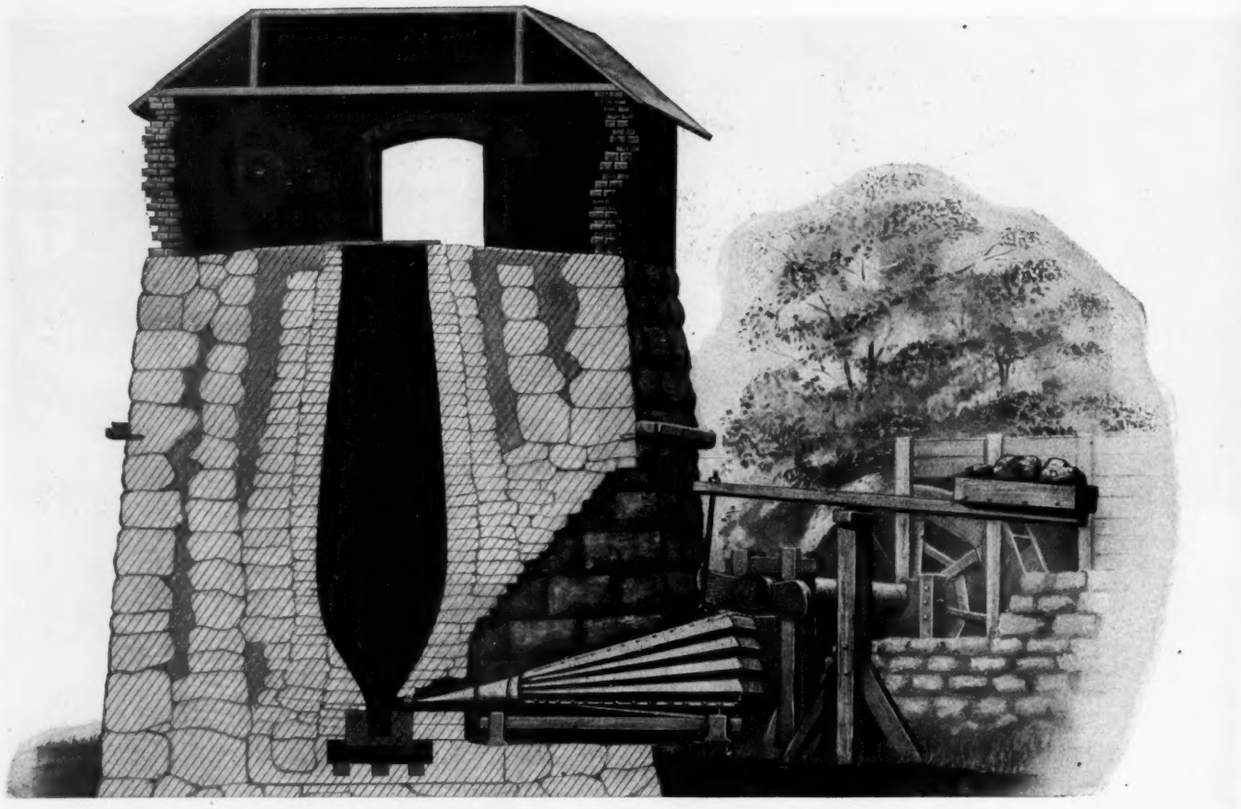
As early as 1721, Swedish iron was recognized as the most superior for many purposes, and comparatively large quantities were exported. This superiority was mainly due to the excellent quality of the ore produced, which can be seen from the following not uncommon analysis:

Iron	68.05 per cent
Phosphorus	0.003 per cent
Sulphur	0.003 per cent

The export of Swedish iron in 1904 was 3,065,000 tons.

In the early times the ore was mined by burning wood on rocks, whereby the ore could be loosened and broken by a hammer. In 1729, this tedious and expensive method was substituted by hand drilling and powder blasting; in 1867, dynamite was introduced; and at the present time "sebastine" and modern pneumatic tools are employed.

In the beginning the ore was loaded at the mines by hand onto sledges drawn by horses, sometimes several miles, to the blast furnaces. As the mines deepened (some now being 825 feet), hemp and leather hoisting ropes became necessary, and power was furnished by means of water-wheels, and sometimes horses, until the year 1727, when the first so-called "fire-and-air"



A Seventeenth Century Swedish Blast Furnace.

hoisting engine was invented. About the same time the world-famed mechanic, Kristofer Polhem, introduced his automatic hoisting machines for mines, as well as his long-distance "stanggangar," whereby power was transmitted several miles from the waterfalls to the mines. In 1805, some mines were equipped with steam engines for power, and the hemp hoisting ropes were replaced by the so-called "iron link" rope, which, 40 years later, was superseded by regular wire ropes.

In 1800, 400 blast furnaces were operated in the country, all practically of one design, and not much improved over the original installations. Owing to competition, the government, recognizing the importance of improving quality rather than increasing quantity, organized a so-called iron office (Jernkontoret) in 1745, which was composed of the foremost experts. This office served as a connecting link between the Swedish iron masters and the government. In 1753, a proclamation was issued that all blast furnaces must be supervised by men who possessed a thorough theoretical, as well as practical, knowledge in producing pig iron, and books were issued containing information regarding the latest developments and principles of iron and steel manufacture. This helped to remove the deep-rooted superstition and many false ideas that were entertained by the iron workers, and placed this industry on an entirely scientific basis.

The year 1825 marks the beginning of the new era of the Swedish blast furnace practice, the most important improvements being larger stacks, with iron binding or shells and thin linings, roasting of the ore by means of waste furnace gases in properly constructed calcining stacks; in 1829 were introduced hot blast stoves, the crushing of ore by means of machinery, skip hoists for raising the ore and fuel to the top of the stack; in 1835, blowing engines, mostly driven by water power—all of which tended to increase the capacities of each furnace and reduce the time required for blowing in the furnace to four or five days, instead of 21, as in the early times. It also reduced the number of furnaces, so that, whereas, in 1873, 307 furnaces were running, giving an annual production of 80,000 tons, in 1902 only 136 furnaces were operated, producing 538,000 tons. (In 1904, 87,000 tons of pig iron were exported.)

Prior to 1850 the usual height of the stacks was about 30 feet, and the usual diameter at the bosh about 8 feet. The present dimensions are from 45 to 60 feet high, and 9 to 10 feet at the bosh. The production of each furnace varies from 15 to 70 tons per day. Swedish metallurgists consider 50 tons per day a good maximum, mainly on account of the soft and brittle charcoal which is used for fuel. This means comparatively low furnaces and small charges. The charcoal being practically free from phosphorus and sulphur and containing a very small percentage of ash, has a beneficial influence on the quality of the iron.

At the present time the Swedish blast furnace practice, although on a smaller scale, is as up-to-date as in any country, and on account of the competition, and the fact that a considerable export tonnage has been diverted by the introduction in other countries of the basic process for the manufacture of mild steel, nearly as pure as that of the Swedish grades, the Swedish manufacturers have been compelled to respond by keying up the quality of their iron even further. This is done by magnetic ore separation, special calcining and briquetting of the finer ores, and by extreme care in selecting the proper ores to suit the purpose for which the iron and steel are to be used. This also necessitates that every blast furnace in Sweden be directly superintended by a highly technically educated metallurgist and chemist, who

has entire control of all the operations and processes.

Swedish pig iron for export contains usually the following analysis:

Phosphorus .....0.014—0.019 per cent
Sulphur .....0.005—0.010 per cent
Silicon .....0.20 —0.60 per cent
Manganese .....0.60 —0.80 per cent

The largest percentage of Swedish iron is made in charcoal furnaces by the old Lancashire method, and when pig iron of the above composition is again reduced by such a harmless fuel as charcoal, it is no wonder if the result is absolutely pure iron of the softest possible texture, practically free from the injurious elements sulphur and phosphorus. No doubt it will maintain the excellent reputation it has in its use and suitability for iron wire ropes. Compared with puddled iron, that made in the Lancashire hearths is practically free from slag, and hence more homogeneous and reliable.

Without the efforts of Mr. Goransson, owner of the Sandviken Works, Bessemer steel would not have achieved its present reputation. He began to successfully produce Bessemer steel in 1858, and since that time the Swedish metallurgists have endeavored to improve the quality by entirely different practice than used in most of the steel-producing countries, the molten iron being taken direct from the blast furnace into converters, which have a capacity of only three to six tons. The small charges, coupled with extreme care and good judgment, enable them to produce in these converters a steel equal in many respects to high carbon crucible steel.

Ordinary analysis of Swedish Bessemer steel is as follows:

Phosphorus ..... 0.020—0.024 per cent
Sulphur .....traces—0.005 per cent
Silicon ..... 0.025—0.035 per cent
Manganese .....0.20 —0.30 per cent

In the openhearth (Martin) furnaces the same care is used, and the charges are seldom over 15 to 20 tons, in order to better control the quality of each heat. Gas is usually furnished from producers fired with wood, which fuel has no harmful influence on the steel. Besides this, a great many new processes have been introduced in their open-hearth practice, and many elaborate experiments are being tried with the aid of electricity.

All the raw material and pig iron is subjected to the most careful chemical analysis. The finished goods, such as bars, rods, wire and plates, are always subjected to the most complete physical tests, and the causes for the slightest variations in the results are always investigated. —*American Wire Rope News.*

HIGH TENSION STEELS[1]

Results of Tests on Alloy Steels With Varying Physical Properties

By Percy Longmuir, B. Met. (Sheffield).

The modern high-speed engine has resulted in the introduction of various types of high-tension steels, so termed in that high tensile properties are demanded by the builders. Objection to the term may arise from the fact that steels of high endurance rather than high tensile properties are required. However, as the majority of steels are judged by tension tests, the term is here taken to include endurance as well, i. e., high resistance to the actual conditions of working which are not necessarily limited to tensile stresses.

The ideal steel is one possessing good properties in its normal state, admitting of ready improvements by reasonable treatment, and capable of yielding regular results under ordinary commercial conditions of production and manipulation. In surveying the available field, attention is naturally directed first to nickel steels. Experience has shown that these steels have not realized the sanguine expectations entertained some years ago; still, in many directions they serve most useful purposes. The development of alloy steels into which nickel enters as a constituent has led to the introduction of nickel-chromium, nickel-vanadium, and chromium-vanadium steels, each type of steel possessing characteristic properties.

Some two years ago a series of experiments was commenced with a view of deciding the most serviceable type of steel for high tension and endurance purposes. The experimental work has been conducted in co-operation with Messrs. S. Fox & Co., Ltd., Sheffield, and the author's heartiest thanks are tendered to this firm for the many facilities afforded and for permission to publish the results obtained.

Nickel Steels.

The seventh report to the Alloys Research committee* gives the properties of a series of ascending nickel steels. The commercial members of this series are included in the following table:—

TABLE I.[2]

Content of nickel per cent.	Bending test, angle.	Tensile Tests. Yield point, tons per sq. in.	Maximum stress, tons per sq. in.	Elongation per cent on 2 in.	Reduction of area, per cent.	Torsion Tests. Twisting moment, inch-pounds.	Angle of twist at fracture.
nil	180°, unbroken.	21.00	38.19	25.0	51.73	4277	...
1.20	180°, unbroken.	23.92	40.93	21.0	42.80	5077	405
2.15	180°, unbroken.	23.67	41.52	24.5	51.83	5609	621
4.25	180°, unbroken.	29.16	47.86	20.0	33.06	5071	468
4.95	30°, broken...	33.95	60.09	2.0	3.71	6429	177

The steels are in a normal condition. These values are of interest in showing the effect of an ascending percentage of nickel on tensile and torsional properties, the first steel containing no nickel and forming a base line for comparison. Two features are worth careful notice:—

1. Nickel steels do not give very exceptional properties in the untreated state.

2. In a steel containing between 4.25 per cent and 4.95 per cent nickel with carbon about 0.40 per cent and manganese from 0.8 to 1.0 per cent, a decisive change in properties occurs. Within these limits a brittle zone is entered.

This characteristic brittle zone, which appears to vary with the amount of carbon present, has been noted in most published investigations, but attention was first drawn to it by Sir Robert Hadfield in 1898† in an exhaustive examination of alloys of iron and nickel low in carbon.

Practice recognizes the necessity of treatment, and experience has shown the safe limits to which nickel may be added to a steel of given carbon content. An ordinary commercial nickel steel, containing 2.95 per cent

[1]A paper presented at the meeting of the Iron and Steel Institute, London, May 13, 1909.

[2]In this and following tables, ton = 2,240 pounds.

*Institution of Mechanical Engineers, Carpenter, Hadfield and Longmuir.

†Proceedings of the Institution of Civil Engineers, Vol. cxxxviii.

of nickel and 0.20 per cent of carbon, subjected to various forms of treatment, gave the results shown in Table II.

TABLE II.—2.95 PER CENT NICKEL STEEL.

No.	Treatment.	Elastic limit, tons per sq. in.	Maximum stress, tons per sq. in.	Elongation, per cent on 2 in.	Reduction of area, per cent.
1	As received	26.91	40.19	29.0	56.3
2	Air cooled from 800° C.	29.04	39.10	30.0	58.3
3	Air cooled from 900° C.	27.50	39.20	30.5	55.9
4	Air cooled from 950° C.	29.58	39.17	27.5	56.6
5	Quenched in oil from 760° C. tempered 435°	28.52	41.91	27.0	59.3
6	Quenched in oil from 760° C. tempered 530°	31.90	43.76	27.5	57.2
7	Quenched in oil from 760° C. tempered 630°	32.43	43.07	28.5	59.1
8	Quenched in oil from 760° C. tempered 670°	31.41	41.14	28.0	59.1
9	Quenched in water from 780° C. tempered 420°	69.88	77.95	10.0	42.1
10	Quenched in water from 780° C. tempered 600°	50.89	55.91	17.5	57.9
11	Quenched in water from 780° C. tempered 660°	37.64	47.68	21.5	54.1
12	Quenched in water from 920° C. tempered 460°	51.53	60.12	10.5	26.6
13	Quenched in water from 920° C. tempered 550°	60.61	63.84	19.5	51.1
14	Quenched in water from 920° C. tempered 550°	59.93	61.98	15.0	53.4

The air-cooled specimens show that, so far as a temperature range of 800 degrees Cent. to 950 degrees Cent. is concerned, very little effct on tensile properties results. Nos. 5 to 8 show that a moderate oil-quenching temperature has also little or no effect on this particular steel, hence the effect of a rising temperature is lost. Water-quenching from 780 degrees Cent. results in a considerable change, and the effect of a rising temperature is well evidenced. Nos. 12 to 14 are erratic, and whilst a difference of 90 degrees might possibly account for the difference in elongation between 12 and 13, it cannot account for the difference in elastic limits. No. 14, in precisely the same condition as 13, gives a lower elongation, and is therefore included by way of contrast.

A second set of experiments are recorded in Table III, the steel in this case being comparable with the preceding sample, i. e., low carbon, 3 per cent nickel commercial steel.

With one exception all the elongations are good; however, the elastic limits are low except in the case of No. 22. From the two sets of experiments, it is fairly reasonable to conclude that, under normal oil-quenching conditions, average properties of a low carbon steel containing 3 per cent nickel would be of the following order:

Elastic Limit. Tons per sq. in.	Maximum Stress. Tons per sq. in.	Elongation per cent on 2 in.
30	40	24

TABLE III.—3.0 PER CENT NICKEL STEEL.

No.	Treatment.	Elastic limit, tons per sq. in.	Maximum stress, tons per sq. in.	Elongation, per cent on 2 in.	Reduction of area, per cent.
15	As received	29.2	38.60	23.5	54.8
16	Air cooled from 800° C.	24.5	34.32	30.0	57.2
17	Heated to 1000° C., oil quenched at 1000° C., tempered at 490°....	34.0	44.40	25.0	61.6
18	Heated to 1000° C., oil quenched at 1000° C., tempered at 490°...	29.6	42.52	26.0	63.2
19	Heated to 1000° C., oil quenched at 900° C., tempered at 490°....	33.2	44.20	22.5	64.0
20	Heated to 1000° C., oil quenched at 750° C., tempered at 490°....	30.0	42.0	26.0	63.2
21	Heated to 800° C., oil quenched at 800° C., tempered at 490°....	28.4	41.24	28.0	64.0
22	Heated to 1000° C., oil quenched at 1000° C., tempered at 490°....	43.2	50.60	15.5	50.0

Under exceptional conditions higher values may be obtained, but experience teaches that with an elongation greater than 20 per cent, yield points exceeding 30 tons are not regularly obtained.

If treated to give a high yield point a corresponding decrease in elongation follows. It is fairly obvious that a yield point of 30 tons and an elongation of 24 per cent represents a most useful steel and one valuable for many purposes.

Average high-tension requirements are of the following order:—

Elastic limit .....40 tons per sq. in.
Maximum stress .....50 tons per sq. in.
Elongation .....20 per cent on 2 in.

Greater values are sometimes specified, but the foregoing represent average and more rational requirements. Higher nickel steels are more successful in meeting two of these requirements, and a few results obtained from a 5 per cent nickel steel of low carbon are included in Table IV.

TABLE IV.—5 PER CENT NICKEL STEEL.

No.	Treatment.	Elastic limit, tons per sq. in.	Maximum stress, tons per sq. in.	Elongation, per cent on 2 in.	Reduction of area, per cent.
23	As received	47.6	59.96	13.5	20.0
24	Air cooled from 800° C	34.8	49.08	18.0	38.0
25	Heated to 1000° C., quenched in oil at 1000° C., tempered at 490°	64.8	76.00	12.5	43.6
26	Heated to 1000° C., quenched in oil at 1000° C., tempered at 490°	68.4	70.92	10.0	37.6
27	Heated to 1000° C., quenched in oil at 900° C., tempered at 490°	66.8	70.08	12.5	45.2
28	Heated to 1000° C., quenched in oil at 750° C., tempered at 490°	not detected	82.56	1.5	0.4
29	Heated to 800° C., quenched in oil at 800° C., tempered at 490°	65.2	78.40	3.0	2.5

From an all-round point of view it is evident that this steel is in its best condition in the normalized state, as in No. 24. Elastic limit and maximum stress are high in the treated state, but elongations are low. In this respect Nos. 28 and 29 are peculiar in the low elongation accompanying the lower quenching temperatures. After treating, the steels are readily machined, a remark also applicable to water-quenched samples. However, water quenching in this case resulted in the development of cracks.

It is possible that by special treatment higher elongations may be obtained, but under ordinary conditions values of 20 per cent are not easily attainable. Therefore the higher nickel steels, while valuable in certain directions, are not applicable where high tensile strength associated with high elongation is required.

Nickel Chromium Steels.

Nickel steels stiffened by small amounts of chromium find various applications in practice. These steels readily admit of oil or water quenching, and, further, admit of considerable stiffening by air quenching. Some interesting results have been published by Guillet, and the following values are taken from his paper read before this institute.*

Steel containing carbon from 0.25 to 0.45 per cent; nickel from 2.5 to 2.75 per cent; and chromium from 0.275 to 0.60 per cent, gives:

Condition.	Elastic Limit. Tons per sq. in.	Maximum Stress. Tons per sq. in.	Elongation per ct.on 2in.
Annealed 900° C. and slowly cooled	22.5 to 31.75	35.0 to 47.5	15 to 25
Quenched 850° C., reheated to 350°	38.0 to 63.5	50.75 to 70.0	8 to 12

Steel containing carbon 0.25 to 0.45 per cent; nickel, 5 to 6 per cent; and chromium, 0.5 to 1.0 per cent, gives:

Condition.	Elastic Limit. Tons per sq. in.	Maximum Stress. Tons per sq. in.	Elongation per ct.on 2in.
Annealed 900° C. and slowly cooled	35.0 to 47.5	41.75 to 55.25	20 to 25
Quenched in water, not reheated	41.5 to 70.0	50.75 to 79.5	11 to 18

Nos. 30 to 36 represent a steel containing 0.30 per cent of carbon, 5.0 per cent of nickel, and 1.0 per cent of chromium. No. 37 contains 0.40 per cent of carbon, 3.0 per cent of nickel, and 0.5 per cent of chromium.

The results show a considerable advance on simple nickel steel, and the characteristic features are high elastic limits and maximum stress, with fair elongation. Under ordinary condi-

*"Steel Used for Motor Car Construction in France," *Journal of the Iron and Steel Institute*, 1905, No. II, p. 166.

tions, 20 per cent elongation can rarely be exceeded when treated for high yield point and maximum stress. Under these conditions the difficulty lies in approaching 20 per cent elongation, and as a rule it is safer to take 15 per cent as a normal average value.

As an illustration of the high value obtainable from nickel chromium steels, the following tests from commercial forgings are quoted:

TABLE V.—NICKEL CHROMIUM STEELS.

No.	Condition.	Elastic limit, tons per sq. in.	Maximum stress, tons per sq. in.	Elongation, per cent on 2 in.	Reduction of area, per cent.
30	Annealed	28.8	44.8	25.0	50.0
31	Treated, i. e., quenched in water from 850° C. to 900° C., and tempered at 550° C.....	58.48	63.84	16.0	39.6
32		59.63	66.23	16.0	38.6
33		52.42	61.16	18.0	41.6
34		59.74	64.28	19.5	47.2
35		56.70	63.66	20.0	43.4
36		55.08	61.88	21.0	45.4
37		40.0	55.0	18.0	46.0

Treated nickel chromium steels are machinable, but not freely so, and greater difficulty is encountered than with treated nickel steel.

Vanadium Steels.

The literature of vanadium steel is fairly rich, and during the last year or so many favorable articles have appeared in various technical journals. The first definite results were obtained by Arnold and privately published. Some of these results, quoted by Harbord,* show extremely high tensile values.

Sankey and Kent Smith† have investigated the heat treatment of chromium vanadium steels, and their results are of considerable importance. Possibly one of the most valuable features shown by these investigators is the high resistance of the steel under dynamic tests. This feature is well exemplified in the results obtained by Arnold's alternating stress test and Izod's pendulum impact test. In the treated state tensile values are notably high; this, in conjunction with high alternating and impact values, renders the steel of considerable value. By way of illustration the following result from Sankey and Kent Smith's paper may be quoted:

No.	Treatment.	Elastic Limit. Tons.	Maximum Stress. Tons.	Elongation, per cent on 2 in.	Reduction of area, per cent.	Izod Impact Test. Ft.-lbs. average.	Arnold Alternating. No. alternations.
24	Oil quenched at 900° C. Reheated to 600° C.	43.4	53.6	22.0	56.6	13.4	1938

These values are exceptionally good, and, provided similar results could be regularly obtained in practice, the steel would obviously approach the ideal.

Various types of vanadium steel have been investigated from the point of (1) production, and (2) treatment under commercial conditions. The types included nickel vanadium and chromium vanadium, the latter series proving the best all-round steels as judged by ordinary commercial standards. A triple chromium nickel vanadium steel would, under certain conditions, prove of value in structural work.

TABLE VI.—CHROMIUM VANADIUM STEELS.

No.	Treatment.	Elastic limit, tons per sq. in.	Maximum stress, tons per sq. in.	Elongation, per cent on 2 in.	Reduction of area, per cent.
38	Air cooled from 800° C.	27.28	40.51	27.5	57.5
39	Quenched from 920° C. in water, tempered at 550°	58.08	66.22	14.5	48.0
40	Quenched from 900° C. in water, tempered at 550°	47.62	55.01	19.5	57.0
41	Quenched from 760° C. in water, tempered at 550°	40.51	52.09	23.5	57.9
42	Quenched from 800° C. in oil, tempered at 460°	43.92	52.29	20.0	48.4
43	Quenched from 920° C. in oil at 100° C. (not tempered)	35.55	46.25	21.0	55.1
44	Quenched from 900° C. in oil at 100° C. (not tempered)	33.37	44.53	22.5	56.3
45	Quenched from 760° C. in oil at 100° C. (not tempered)	30.37	41.21	29.5	60.5

The results recorded are obtained from an experimental steel containing only 0.40 per cent of chromium and 0.18 per cent of vanadium. In view of the low percentage of special elements, the values are decidedly good. Naturally a higher percentage of chromium gives better values, and although the preliminary work led to the recognition of several types of commercial chromium vanadium steels, the type coming within the category of this paper contains:

	Per cent.
Carbon	0.35
Chromium	1.0
Vanadium	0.20

with sulphur and phosphorus, each below 0.035 per cent.

The tests recorded in Table VII are from two separate casts of open-hearth steel, produced under the ordinary conditions of practice, in charges of 15 and 20 tons respectively. The object is to give tests from the billets and various sizes of bars from each cast.

TABLE VII.—CHROMIUM VANADIUM STEEL BARS.

No.	Condition.	Elastic limit, tons per sq. in.	Maximum stress, tons per sq. in.	Elongation, per cent, on 2 in.	Reduction of area, per cent.
46	Piece cut from cogged billet	32.0	47.4	24.0	48.0
47	1 inch diameter rolled bar	46.04	57.13	34.0	51.1
48	1½ in. diameter rolled bar	39.58	55.02	25.5	....
49	3 inch diameter hammered bar	38.58	48.92	20.5	....
50	4 inch diameter hammered bar	37.06	50.90	25.0	....
51	Piece cut from cogged billet	34.8	50.10	23.5	34.8
52	1⅛ inch diameter rolled bar	46.78	64.38	27.0	52.6
53	1 inch diameter rolled bar	41.34	52.42	28.0	55.8
54	2 inch diameter rolled bar	40.08	51.08	22.5	43.4
55	2⅞ in. diameter rolled bar	37.06	49.74	20.5	33.6

Nos. 46 and 51, representing rough billets on which very little work has been put, are very striking; No. 47, giving an elongation of 34 per cent and an elastic limit of 46 tons per square inch, is specially noteworthy. Another length of this bar, after bending parallel, was flattened together in the cold by blows from a 5-ton hammer without developing any sign of flaw. The elongation values of Table VII are of special interest when compared with the values given under elastic limit.

Test bars from treated cranks and axles yield high values corresponding to those recorded in Table V. A few typical results are given in Table VIII.

TABLE VIII.—TREATED CHROMIUM VANADIUM STEELS.

No.	Test cut from—	Elastic limit, tons per sq. in.	Maximum stress, tons per sq. in.	Elongation, per cent, on 2 in.	Reduction of area, per cent.
56	1 inch diameter bar...	63.48	67.68	17.0	....
57	Crank	56.44	64.78	15.0	....
58	Axle	61.34	67.32	17.0	33.6
59	Axle	56.16	63.12	22.0	47.2

The steel represented in this table contained 0.32 per cent of carbon, 1.10 per cent of chromium, and 0.16 per cent of vanadium, and the treatment—water-quenching from 900 degrees Cent., followed by moderate tempering—is designed to give high yield point and maximum stress. A number of tests from actual forgings treated as above give values between Nos. 56 and 59. This section of the work

* "Metallurgy of Steel," p. 637.

† "Heat Treatment Experiments with Chrome Vanadium Steels," Institution of Mechanical Engineers, December, 1904, p. 1235.

showed that a chromium vanadium steel of the foregoing type will yield values quite equal to those of a 5 per cent nickel and 1 per cent chromium steel.

The most noteworthy feature of chromium vanadium steel is its "endurance," and the progress of the work has shown that with no special treatment exceptionally good results are regularly obtained, as in Table VII. When treatment is desired, the most intricate forgings are readily and effectively dealt with by oil-quenching. A quenching range of from 850 degrees to 900 degrees C. and a tempering range of from 500 degrees to 600 degrees Cent., yield excellent results. With this treatment resulting values exceed:

Elastic limit	40 tons per sq. in.
Maximum stress	50 tons per sq. in.
Elongation	20 per cent on 2 in.
Reduction of area	45 per cent.

In addition, excellent bending, torsion, impact and alternating values are obtained. It is not proposed to quote a series of tests, but to take the following concrete case. Two cranks treated as shown in the tables were cut up into various test pieces, the values obtained therefore represent the crank and not test pieces attached to it:

TABLE IX.—CHROMIUM VANADIUM STEEL CRANKS.

TENSILE TESTS.

No.	Treatment.	Elastic limit, tons per sq. in.	Maximum stress, tons per sq. in.	Elongation, per cent, on 2 in.	Reduction of area, per cent.
60	Quenched from 800° C. in water, tempered 545° C.	38.84	49.08	21.0	49.6
61	Quenched from 800° C. in water, tempered 545° C.	39.36	49.44	21.5	52.4
62	Quenched from 900° C. in oil, tempered 545° C.	49.00	56.52	21.0	56.0
63	Quenched from 900° C. in oil, tempered 545° C.	44.56	56.40	23.0	56.8

HARDNESS DETERMINATION.

No.	Treatment.	Position.	Brinell's Hardness No.
66	Quenched from 800° C. in water, tempered 545° C.	Outer surface.	210
67	Quenched from 800° C. in water, tempered 545° C.	Cross section, internal.	218
68	Quenched from 900° C. in oil, tempered 545° C.	Outer surface.	246
69	Quenched from 900° C. in oil, tempered 545° C.	Cross section, internal.	255

TORSION TESTS.

No.	Treatment.	Calculated shearing stress, maximum tons per sq. in.	Final twist. Angle.	Final twist. No. of twists.
64	Quenched from 800° C. in water, tempered 545° C.	44.7	1174	3.26
65	Quenched from 900° C. in oil, tempered 545° C.	53.7	1156	3.21

ANALYSIS.

Carbon. Per cent.	Manganese. Per cent.	Chromium. Per cent.	Vanadium. Per cent.
0.32	0.45	1.10	0.16

A higher water-quenching temperature would have given values of the order shown in Table VIII. In reference to hardness, each value reported represents the average of six determinations taken along the surface and across the section. In each case bending test bars bend through an angle of 180 degrees and may be afterwards hammered together without producing fracture. A comparison of the tensile, torsional, and hardness values of Table IX is of considerable interest to crank manufacturers.

As a contrast to the foregoing some tests from nickel cranks are included in Table X:

TABLE X.—NICKEL STEEL CRANKS.

TENSILE TESTS.

No.	Nickel, per cent.	Maximum stress, tons, per sq. in.	Elongation per cent, on 2 in.	Reduction of area, per cent.
70A	3.22	41.90	27.4	46.7
71B	3.42	31.80	37.9	52.4

TORSION TESTS.

No.	Nickel, per cent.	Maximum stress, tons, per sq. in.	Final twist, angle. Degrees.
72A	3.22	10.3	493
73B	3.42	8.6	540

BENDING TESTS.

No.	Nickel, per cent.	Test bar, sq. in.	Tons at centre, per cent.	Angle of bend, degrees.
74A	3.22	1¼	20.0	70
75B	3.42	1¼	14.9	90

The two cranks represented in the above tests are of typical commercial nickel steel, and on the whole give very satisfactory tensile tests; however, the torsion tests are anything but good. The working life of these cranks is, in the case of A, a mileage of 41,356, and in case of B a mileage of 39,523 on a British railway. It will be noted that these figures are considerably below those usual with ordinary wrought-iron cranks.

A comparison of Tables IX and X shows distinctly in favor of chromium vanadium steel as judged by tensile and torsion tests. Experience gained during the progress of this work clearly shows that for all-round properties chromium vanadium steel is excellent. Whilst individual tests always give good results, it is the combination of properties which denotes the special virtues of this steel.

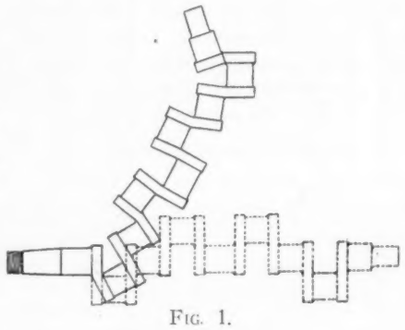


FIG. 1.

Sankey and Kent Smith, in the paper already quoted, have shown the high values obtained from chromium vanadium steels in the Arnold alternating stress test and in the Izod pendulum impact test. In the present work test pieces cut from commercial forgings have given Izod impact values of from 9 to 15 foot-pounds. Rotating alternating stress tests have also given good results, and extremely high values have been obtained from the Stead alternate bending test.

A series of comparatively rough tests have been made; for example, treated axles 1½-inch diameter, giving yield points of 45 tons per square inch and elongation of 20 per cent or over, will bend parallel and then hamm r close without developing flaws. This test is severe, and has to be effected by blows from a 5-ton hammer, and after each blow the resilience of the steel is shown in a perceptible return of the axle. Fig. 1 shows another type of test of a finished hollow crank.

The crank was gripped at one end under a 5-ton hammer, a bar inserted in the free end and attached to a steam-crane. Difficulty was met in obtaining any permanent bending; for example, after lifting the free end of the crank about 6 inches, releasing the lifting moment resulted in a return to the original position. Finally, the

bend shown was obtained, and the point of fracture in which most of the stresses were first felt is indicated. It should be added that this particular crank was forged from the top billet of an ingot and contained a very visible pipe. In other words, the crank was made from steel, which in the ordinary course is cropped and scrapped. Tests of this kind give the author considerable faith in treated chromium vanadium steel. With suitable manipulations more picturesque results are obtained, but Fig. 1 is given as an example of a rough and severe test.

The tests recorded in the foregoing are all from commercial steels, and no abnormal values are given. The object has been to group up typical tests of high-tension steels, and naturally only a portion of the ground covered can be dealt with in a short paper.

The work done shows that nickel steels do not give the high values obtained from nickel chromium or chromium vanadium. The last two represent exceptionally good types of high-tension steels, but for all-round properties chromium vanadium gives the best results. At the moment vanadium is attracting much attention, but the only point from which it has been considered in this paper is that of applicability as a structural steel. The results amply confirm previous work in this direction, and go to show that a remarkable range of properties may be obtained by suitable manipulation in conjunction with a moderate percentage of chromium. The value of the steel as a constructive material in the case of high-speed engines is evident.

A NEW FRICTION CLUTCH.

We present herewith illustrations of the Lemley friction clutch manufactured by the W. A. Jones Foundry & Machine Co., Chicago, Ill.

Fig. 1 illustrates a clutch pulley. The friction disc is bolted to the pulley arms; hard maple block segments are riveted on each side of the disc, making a complete continuous friction surface. For convenience in replacing the friction blocks, the disc is split, and by removing the cap screws which secure the disc to the pulley arms, the pulley can be moved out of the way and the disc taken out. In case the pulley cannot be moved, the pins holding the toggles to hub C can be withdrawn and the front plate and sliding collar can then be moved out of the way and the disc removed. One operation adjusts all toggles equally. The adjusting ring nut is threaded to fit the hub of the front friction plate. This ring nut is split and is clamped to the friction plate hub by bolt M. Adjustment is made by loosening nut M and turning ring nut to the left to tighten, and to the right to release, tightening nut M after adjustment is made. When clutch is disengaged, the spring shown in Fig. 2 separates the friction plates. The spring release is used to simplify the toggle arrangement. The springs cannot be responsible for lost motion, while the toggle arrangement with many joints makes trouble in that direction possible. The inventor has had 12 years experience building clutches, and in designing this clutch claims to have avoided the causes of most clutch troubles.

Fig. 2 illustrates a clutch coupling. This is the same in every respect as clutch in Fig. 1, except the front friction plate. This is made V shape in order to center the shafts thould they be slightly out of alignment when clutch is disengaged.

Fig. 3 illustrates the assembled clutch. A pulley, gear, sheave or sprocket, can be keyed or clamped to the clutch sleeve in place of the method illustrated in Fig 1.

The fourth stack of the National Tube Co.'s plant at Lorain, O., was lighted May 17.

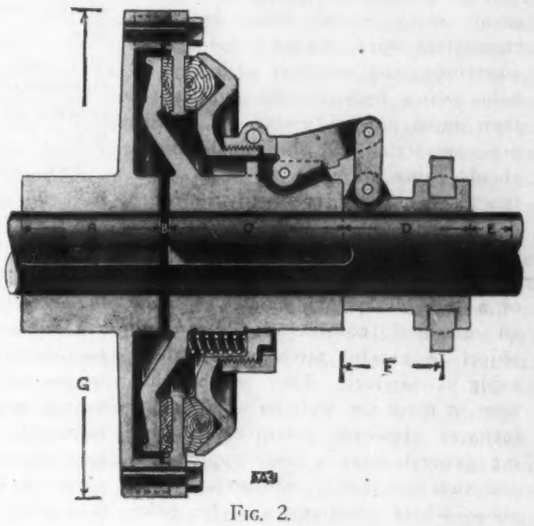


Fig. 2.

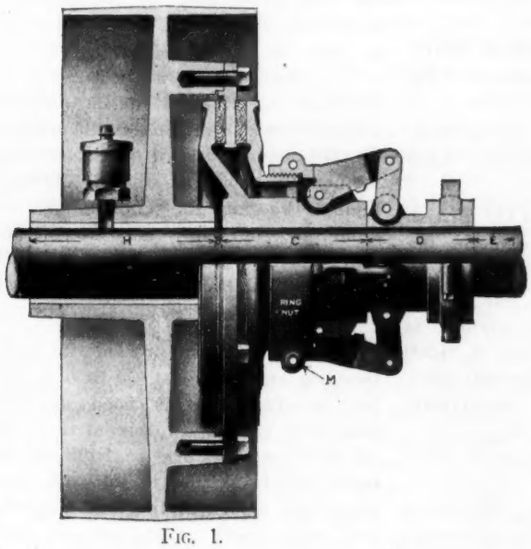


Fig. 1.

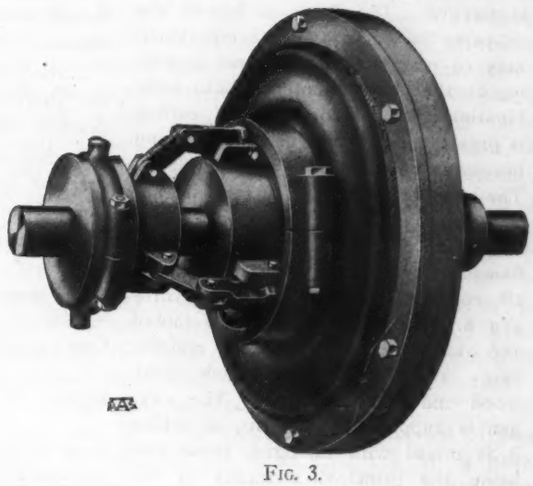


Fig. 3.

OIL FURNACES AND THE ECONOMICAL HANDLING OF OIL AS FUEL.

JNO. E. ULRICH.

Fuel oils or petroleum oils are nature's most condensed fuels, the heat units per pound being nearly 50 per cent greater than the best grades of coal. They are also made up almost entirely of combustibles, so that when burned they leave no ash. When compared with coal, these are items greatly in favor of oils as fuel, and in such comparisons the primary considerations are, undoubtedly, the ease of regulation, and the heating capacity of the fires. With oil the fires can be regulated to a nicety, and when the oil is turned off, the expense stops. The convenience of the fires, and the labor saved over handling coal and ash are items which, even when the price of oil is in excess of that of coal, make oil preferable. A great many cases have presented themselves where the oil is being used wastefully, and we hear of many oil fields which once seemed limitless in their supply of oil, giving out. This, not considering any individual saving, should cause all users of oil to practice the most rigid economy in order not to abuse one of our great national resources.

Economy, then, in the operation of a fuel oil system should be made an essential consideration, and an object of careful attention by those using it as fuel. The writer has here in mind the welding and forging furnaces. However, these remarks, being general, have a wide application; and thus the writer will endeavor to show where economy can be practiced, and the greatest saving made.

Heat is the result of combustion, which is a chemical combination of two or more elements, one of which is oxygen. The flame, a heated gas or vapor raised to a high temperature, may or may not be luminous according to the element entering into combination with the oxygen. If carbon is present, it becomes decomposed and becomes incandescent in the flame. The temperature of a flame is not dependent upon its luminosity, as a hydrogen flame, the palest of all flames, gives the greatest heat. Of all combustibles, carbon and hydrogen are the most widely distributed and available, being the chief constituents of our common fuels—coal, wood and petroleum oils. The oxygen is supplied by the air, in which it is mixed with nitrogen, these two being the principal elements in the air. The symbols and atomic weights which enter into combustion are as follows:

Name	Symbol	Atomic Wgt.
Hydrogen	H	1
Carbon	C	12
Nitrogen	N	14
Oxygen	O	16

If a piece of carbon is heated to incandescence and placed in an insufficient volume of air, each atom of carbon will unite with one of oxygen, forming carbon monoxide—CO; but if air enough is present, each atom of carbon will unite with two atoms of oxygen, forming carbon dioxide—CO_2. The carbon monoxide will, in the presence of air, unite with the oxygen and form carbon dioxide, thus—$CO+O=CO_2$. The nitrogen is an inert gas, and does not contribute to combustion, but as a diluent retards the violence of the chemical combination. It is also reckoned as an absorbent of the energy resulting from combustion. The carbon monoxide is, we may say, the product of imperfect combustion; the carbon dioxide the *product* of *perfect combustion* of carbon.

Two atoms of hydrogen combine with one of oxygen to form water, thus—$2H+O=H_2O$: the relative atomic weights of H_2O being two parts of hydrogen to 16 parts of oxygen, or in ratio of 1 to 8.

The chemical combination of a combustible with oxygen produces energy in the form of heat. The quantity of heat is measured in the British thermal units, B. T. U.'s, or the amount of heat required to raise the temperature of one pound of water 1 degree Fahr. The British thermal units released by the combustion of the one pound of the substance and the resultant temperatures are:

Hydrogen burned to H_2O, 62,032 British thermal unit temperature 5,898 degrees Fahr.

Carbon burned to CO_2, 14,500 British thermal units temperature 4,939 degrees Fahr.

Carbon burned to CO, 4,452 British thermal units temperature 2,358 degrees Fahr.

The great loss of heat due to the imperfect combustion of carbon is easily seen, by the difference of 14,500 —4,452, or 10,048 British thermal units. One pound of carbon imperfectly burned produces $\frac{12+16}{12} = 2\,1/3$ pounds carbon monoxide. Therefore the calorific value of carbon monoxide is $\frac{10,048}{2\,1/3} = 4,312$ British thermal units.

A typical analysis of petroleum is as follows:

Carbon	0.84
Hydrogen	0.14
Oxygen	0.02

Allowing for the oxygen to unite with its equivalent of hydrogen to form water, the calorific value would be based upon the corrected quantities as follows:

Carbon	0.84 × 14,500 =	12,180
Hydrogen	0.1375 × 62,032 =	8,529
Water	0.0225	
		20,709

British thermal units produced when the oil is burned to CO_2.

If the combustion is imperfect the British thermal units produced would be—

0.8400 × 4,452 =	3,739
0.1375 × 62,032 =	8,529
	12,268

or about 60 per cent of that obtained when the combustion is complete. In oils having a small per cent of hydrogen, this loss in heat will be even greater.

From the foregoing it is seen that for the greatest economy the oil must be burned to CO_2 and that, inside the furnace where the resultant heat can be utilized. The absence of smoke does not indicate complete combustion, but there should be an absence of luminous flame from the escaping gases. If more air is introduced into the furnace than is necessary to complete the combustion, a reduction in furnace efficiency will occur. Also an excess of oxygen in the case of forging or welding furnaces will cause scale (oxide of iron) to form on the iron or steel.

To burn oil in a furnace it is necessary to break it up into minute particles, or atomize it with oxygen at the temperature of ignition. The methods of atomizing the oil and supplying the air for combustion are numerous; but they may be divided into a few general classes which shall now be taken up and discussed.

Division of Systems.

In the light of present methods, the drip and fan blast, (2 to 6 ounces per square inch) as used at first, was very crude. In this method the oil is allowed to drip in front of the blast which carries it into the furnace, and makes at the best a smoky fire with much waste of oil both

inside and outside of the furnace. This first step has, of course, been rapidly replaced by better and more scientific methods, and hence we need not discuss it further. Systems of burning oil may be divided into three classes, depending upon the pressure of the air operating them. They are known as the low pressure, high pressure, and a combination of the two which will be called the high-low pressure system.

Low Pressure System: The low pressure system uses fan blast at a pressure of from 6 to 10 ounces. The oil is fed to the burner under pressure either from an elevated supply tank, or from air pressure being supplied to the oil in a reservoir, and then sprayed into the combustion chamber, where it is mixed with the air from the fan. With the elevated tank the system is very simple, consisting of the tank, oil supply pipes, fan and air pipes, which reduces the number of shut-downs due to broken machinery to a minimum. The elevation of the tank, however, is a serious defect. It makes a broken oil pipe a great loss, and increases the danger in case of fire; and in some cases could not be used on account of excessive insurance rates that would be entailed. The tank can be placed underground and the shop air pressure used to force the oil into the burner. An oil pump is then required to lift the oil from the supply tank to the small reservoir above it, where the air pressure is supplied. When no air pressure is available, the small reservoir is elevated to give the required pressure. The low pressure system has the advantage of being simple and easy to operate. The chief difficulty is in the atomizing of the oil, which is not so perfect as when the higher pressure is used.

High Pressure System: In the high pressure system, air from 12 to 20 pounds per square inch is used. The supply tanks are placed underground as explained in the low pressure system. The oil is forced through the burner by the air pressure acting on it in the small reservoir, and by the construction of the burner is atomized by the compressed air as it expands into the furnace. A good burner so thoroughly atomizes, that each particle of oil is in contact with the required amount of air for combustion, and perfect combustion results. Besides the compressed air used, some free air is taken into the opening by the action of the jet, but still a quantity of compressed air is used, and this requires the installation of a large air compressor in a place where many burners are used. This increases the cost of operating, and this fact, together with the noise which accompanies the expanding of the air into the furnace and the throwing of heat on the operator, due to the high pressure in the furnace, are serious objections to the system.

The High-Low Pressure: This is obtained directly from the above discussed systems, and is a combination of the two, as the name implies. The high pressure is used to atomize the oil and the fan blast is depended upon to supply the air for the combustion. This has the advantages of the first two systems, while eliminating their disadvantages; for perfect atomization is obtained and the bulk of air for combustion, being supplied by low pressure air, renders the operation cheaper than compressed air. Some use steam to atomize the oil, but where air can be obtained it should be used, because the steam does not enter into the combustion and is only a foreign substance which must be heated to the temperature of the furnace.

Considering the systems as a whole, although the combined high-low pressure system seems to have several advantages over the other two, still, either one handled properly can be operated economically. Heated oil and properly constructed furnaces that will apply the heat where wanted without waste into the air are the greatest items. The oil, when heated, atomizes more readily, and combustion is freer. Heat applied to the oil supply-tanks is to be recommended, as heating the oil also serves as a purifier inasmuch as it circulates in the tank, causing the impurities to settle at the bottom of the tank where they can be easily drawn off. It is a good plan to run heating pipes beside the oil pipes. A plan the writer has adopted is to run the oil pipes from the pump to the tank inside the heating pipe. Hot water is used, and this goes directly into the supply tanks. This plan has given entire satisfaction, as the oil just before going into the pump is passed through the hottest part of the water, so that even when the supply tank is very cold, hot oil is forced out to the burner. As trouble is caused by impurities getting into the burner, the oil should be passed through a strainer. This can be best done by using an inverted deep well strainer (a long brass tube with numerous narrow slots in it) placed over the suction pipe of the oil pump. The whole arrangement is placed inside a stand pipe, so that the top of the strainer is below the bottom of the supply tank. This insures the immersion of the strainer in oil, otherwise when the oil supply is low and the pump working heavily all the oil in the strainer would be pumped out, especially when the strainer is covered with dirt, and air would be admitted to the system, causing much annoyance.

Furnaces.

In the construction of the furnaces we come nearer to the source of real economy than in any other feature. After the oil has been broken up into fine particles and brought into contact with the right amount of air, the problem confronting the furnace builder is, how to use the heat resulting from combustion to the best advantage in heating. It is evident that space should be provided for the expansion of the gases and provision made for their thorough mixture and distribution in a combustion chamber. In a great many places now using oil, the oil replaced coke or coal; the coal furnaces being converted into oil furnaces. This reconstruction was probably done, in many cases, by men having no experience in burning oil; consequently the combustion chambers were small and the openings following the old practice in the case of coke furnaces, were too large, and allowed the heat to escape into the air, instead of heating the work. The combustion chamber should conform to the shape of the jet of atomized oil as it leaves the burner, this being of a cone shape, so that the oil may not touch the sides. Combustion begins a few inches from the burner, and the oil is burned to CO. Further on the luminousness of the flame disappears, indicating the complete combustion of the carbon. The heated gases are then reflected by means of a reverberatory arch. The openings in the furnace should be as small as possible, and at right angles to the direction at which the oil is injected into the furnace, thus preventing the heat from being expelled from the furnace too forcibly. When the furnace is used for a variety of purposes and all sizes of stock heated, the openings are made large and covered by doors counterbalanced by weights.

In cases where a number of pieces of the same kind are to be heated, the furnace should be large enough

and have heating capacity enough to heat the stock as fast as it can be worked up.

A good substantial furnace is built of cast iron lined with fire brick. The question of fire brick is one that should receive careful attention. In a place operating many furnaces, furnace repairs make up quite an item; and a fallen arch in the middle of a day's run means that the furnace is out of commission until it can be cooled down and repaired, a question of hours, and probably the loss of the rest of the day. A shut-down like this in the busy season is rather expensive, and emphasizes the necessity of careful selection of fire brick. There are many kinds on the market which will last a year or more in a forging furnace; and will last for months in a welding furnace if used in certain places. In a welding furnace the metal is constantly brought up to a dripping heat, and as yet no material has been made which will last for any length of time with the heated metal resting on it. In such furnaces, then, the construction should be such that the bricks can be easily replaced without disturbing other parts of the brick work. Provision should also be made for the disposition of the slag, which, if the furnace is not tapped occasionally, will clog it up. A large part of the brick work can be combined and made up in special shaped pieces, reducing the joints and therefore making a much better construction. The bricks, or sections, are laid in a thin mixture of fire clay and water. After the furnace is bricked, a slow fire should be started so that it will dry out slowly, and the brick become glazed.

Time spent in bringing an oil burning system up-to-date will soon make a showing in dollars and cents, due to the saving in oil, furnace repairs, and increased output.

Chains Without Transverse Welds.

(The following article from *The Engineer*, London, describing a new Belgian process of chain making, in which each link is first formed as a laminated ring and welded between adjustable forming rollers, is extremely interesting. The elimination of a scarfed or transverse weld, preserving the continuity of the fibrous structure of the bar and the resulting greater strength, and the uniformity in size and quality of links, together with the speed of manufacture, will doubtless not be without effect on the chain making business in the United States.—Ed.)

The manufacture of chain cables has hitherto been conducted in much the same manner as when they first came into use. A round iron bar of the diameter intended for the link, cut obliquely at each of its ends, and of length equal to that of the circumference of the work when finished, is worked by hand or by machine power into an oval form, so that the two tapered ends lie one upon the other. The link thus bent is then brought to a welding heat and the two ends are welded together by hand. In the case of the smaller chains this work can be accomplished in a single heat by one smith, alone or with the help of a striker. For the welding of larger chains, however, several heats, and two or even three strikers, become necessary. The weld is generally arranged at one end of the link, but it is also sometimes to be found in the middle of one of the sides. The strength of the whole chain, of course, depends on the faultless execution of the weld in each individual link; that is to say, everything depends upon the reliability, professional knowledge, and skill of the chainsmith.

Now the difficulty of obtaining an absolutely trustworthy weld increases very considerably with the diameter of the link, and even with the best quality of work it often happens that a thick link is only welded at the outer edge, while the middle remains unconnected; and there are no means of judging by outward observation whether the core is welded properly or not. Only a superficial examination of the weld, and the submission of the chain to a tensile test bearing a certain given proportion to its ultimate strength, can be resorted to. At the same time—that is to say, during the course of the tensile test—every link is struck with the hand hammer.

As regards both the quality and the quantity of the work produced—especially where the cables of our large vessels are in question—the whole method of manufacture no longer satisfies the requirements made upon it, and if the best chain-cable makers in existence still succeed in meeting the demands made upon them, this is largely due to the fact that the chain smith's trade has, in a sense, been bequeathed from father to son for generations past, with the result that the smiths are wonderfully proficient. The manufacture of chains, indeed, has its home only in certain particular districts, in which the whole population is exclusively devoted to it, so that one generation in a manner inherits the experience of its predecessor.

To Discover a Method by Machinery.

Under these circumstances it is no wonder that it has for many years been the endeavor to discover a good method for the manufacture of chains by machinery, in order, on the one hand, to attain greater homogeneity and reliability in the product, and make it independent of the personal skill and conscientiousness of the workman, and on the other, to bring the power of production up to the level of the demand. Until recently,

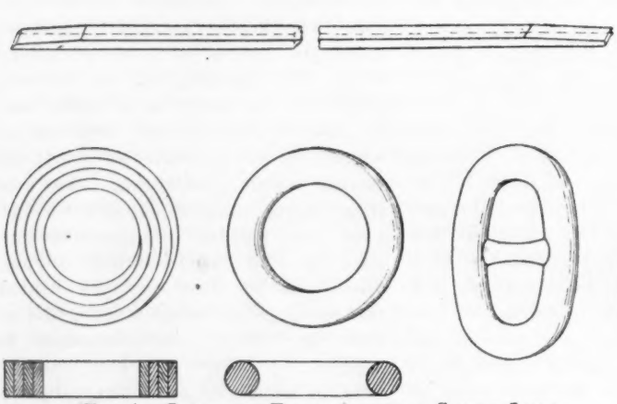


FIG. 1.—STAGES OF FORMATION OF A SINGLE LINK.

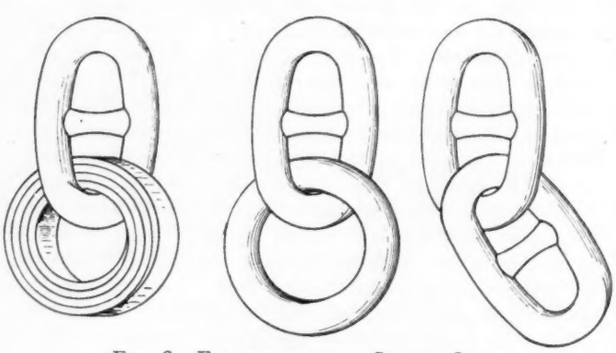


FIG. 2.—FORMATION OF A SECOND LINK.

however, the manifold attempts in this direction in England, Germany, Belgium and France have not brought any marked success, except in the case of thin chains which are subject to relatively small stresses and which are made of wire. These are for the most part welded electrically after the links have been bent together by mechanical means. Above all, of course, the aim was to avoid the transverse weld—in fact, to make chain links entirely without the joint.

The best known efforts in this direction are perhaps those of Strathern (Great Britain), Oury (France), Girlot (Belgium), and Klatte (Germany). The latter rolled mild steel bars of cross-shaped section, and by means of further rolling and slotting formed them into chain links which hung loosely in each other without any transverse joint in the lengthwise direction of the rolled bar. But in spite of endeavors which have been continued for about 20 years with wonderful ingenuity and tenacity of purpose, the production of large cables and crane chains on a commercial scale has not proved possible, first, because the cost of manufacture was great, and secondly, because the public departments and classification societies expressly prescribe the use of wrought iron as the material for chains.

Description of New Method.

A new method for the manufacture of chains of every kind and size from wrought iron has, however, lately been invented by the Belgian engineer, Monsieur Alfred Marion, of Brussels. This invention, which appears to fulfil every practical requirement in a high degree, has been patented in all civilized countries. The sole right of working it in Germany, Austria-Hungary, Russia, and some other continental states, has been secured by the firm of A. Borsig, of Tegel, near Berlin, while John Brown & Co., of Sheffield, have undertaken the manufacture of the chains in England.

The method of manufacture is, shortly, as follows: A flat iron bar brought to a welding heat and wound up on itself in layers into a ring of rectangular cross-section is welded solid, and then by means of additional rolls of suitable size and form is worked into a ring of circular cross-section. By means of a hydraulic press and swage, the ring is now made to take an oval form, and in the case of stud-link chains is at the same time provided with its stud, which is then shrunk tightly into place. Through this link now finished is reaved a second flat bar, which is brought to welding heat, like the first one, and wound into a ring, etc., as before. Figs. 1 and 2 show the various stages passed through in order to produce two complete links.

Details of Manufacture.

The details of the manufacture are somewhat as follows: The flat iron bars *b*—Fig. 3—are brought to a welding heat in the furnace *a*. Directly in front of the furnace stands the winding apparatus, consisting of the two pressing rolls *c* and *d*, the fixed mandril *f*, and the guiding bracket *e*. The two rolls *c* and *d*, which turn in the direction of the arrows, wind the white-hot flat iron bar *b* round the mandril *f*, and in so doing weld it into a solid ring. During winding the last link of the finished chain is kept by a holding appliance in such a position that the winding must take place through it, and the ring, when finished, hangs loosely in it. This ring, however, is of rectangular section, and is accordingly, while still at the welding temperature, introduced into the rounding rolls—Figs. 4 and 5—which stand in the close vicinity of the winding apparatus. The rounding machinery consists of three outer rolls g_1, g_2 and g_3, and the inner roll *h*, all of which are formed to the half-round section of the chain. The roller g_1 is fixed; the axes of the rollers g_2 and g_3, however, can be advanced by hydraulic means in the direction of the arrows. The inner roller can also be raised and lowered, and can at the same time be adjusted in the horizontal plane. The manner of working is as follows: As soon as the rectangular-sectioned ring *i*, which is still at a white heat, is introduced into the apparatus, the rollers g_2 and g_3 are pushed forward by hydraulic apparatus from their dotted positions in the direction of the arrows against the outside of the ring, and thus hold it continuously suspended. At the same time, the inner press-roller *h* is moved in a downward direction from its dotted position until it lies exactly at the same height as the roller g_1. It is then moved under a very powerful pressure radially against the latter. Since the roller g_1 turns at an extremely rapid rate, the square-sectioned ring is gradually rolled out to a round section by the closing together of the curved surfaces of the rollers, the weld-surfaces of the bar forming the ring meanwhile becoming more thoroughly united. A rag or fin is formed during this process at the place where the two rollers *h* and g_1 come together. At the moment when the ring is completely formed this is neatly pared off by means of two circular cutters, and falls to the ground.

Process Occupies Only Five Seconds.

From the insertion of the flat iron bar in the winding apparatus to the completion of the round-sectioned ring the whole process above described occupies only five seconds, all the operations being effected in the most simple manner by hydraulic means.

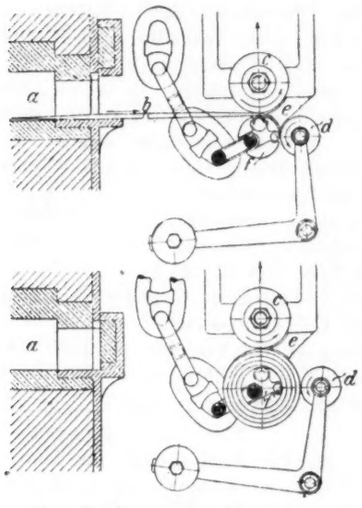


FIG. 3.—REEVING A LINK.

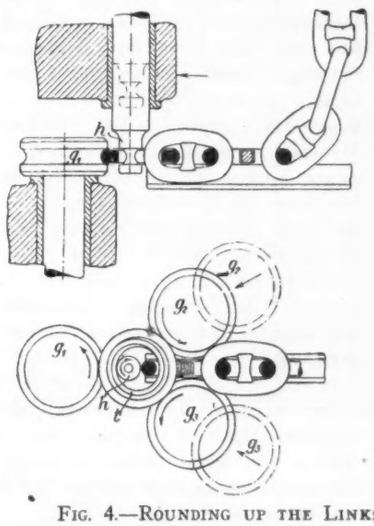


FIG. 4.—ROUNDING UP THE LINKS.

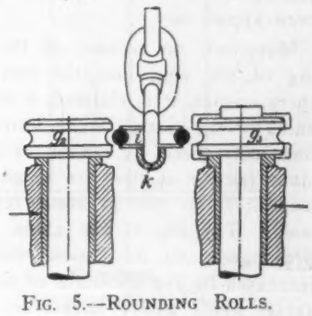


FIG. 5.—ROUNDING ROLLS.

TABLE OF OFFICIAL TESTS MADE ON THREE-LINK SAMPLES OF BORSIG CHAINS (GROSS TONS).

Diameter of link, metal.	Highest stress reached.	Stress per square inch.	Percentage of elongation.	Tensile stresses and elongations prescribed by German Admiralty: Lloyd's Register. Tensile test.	Germanischer Lloyd. Tensile test.	Bureau Veritas. Tensile test.	Tensile test.	Stress per square inch.	Percentage of elongation.
				Tons.	Tons.	Tons.	Tons.	Tons.	
26 mm. (1 in. +), studless	34.8	21.1	12.8	27.00	28.30	28.30	27.20	16.7	8
26 mm. (1 in. +), stud	35.4	21.4	14.1	27.00	28.30	28.30	29.26	17.8	7
33 mm. (1 5/16 in. —), stud	59.4	22.3	15.7	46.50	45.60	45.60	47.20	17.8	7
36 mm. (1 7/16 in. +), stud	67.9	21.5	13.1	51.00	54.20	52.30	56.10	17.8	7
39 mm. (1 9/16 in. —), stud	76.8	20.6	12.3	61.40	60.40	60.20	65.80	17.8	7
42 mm. (1 11/16 in.), studless	93.25	21.0	14.6	71.75	68.90	68.35	76.40	16.7	8
45 mm. (1 13/16 in. —), stud	103.3	20.8	14.4	77.13	79.10	78.47	87.70	17.8	7
60 mm. (2 3/16 in. —), stud	188.8	21.4	17.4	142.10	140.70	139.50	155.80	17.8	7
63 mm. (2 5/16 in. +), stud	192.4	19.8	16.4	157.50	154.70	153.80	171.80	17.8	7
69 mm. (2 7/16 in.), stud	230.2	19.9	15.8	181.00	178.00	177.85	206.10	17.8	7

The ring hanging in the last link is thus still at a bright red heat when it is inserted in a hydraulic press, and the concluding operations of giving its final oval form to the link and inserting the stud are rapidly performed. The structure of the link sections, given in Fig. 3, clearly show the manner in which these have been built up of flat iron bars wound up on themselves and the excellent character of the welding.

It is, of course, clear that there must be separate rolls and press swages for each size of link, and that the various rolling machines must vary correspondingly in power. At the Borsig works three different sets of rolling apparatus are in action for chains of 25 mm. to 36 mm. (1 in. to 1⅜ in.), 36 mm. to 51 mm. (1⅜ in. to 2 in.), and 51 mm. to 90 mm. (2 in. to 3½ in.) diameter of link metal respectively.

It is evident that, provided the best of wrought iron be employed, machine-made chains of this kind must be of very excellent quality, and, compared with those made by the older methods, they are distinguished by the circumstance that all their links are exactly alike, so that they have a very even appearance.

Moreover, on account of the pressing of the ring into the oval form, there ensues, it is claimed, a strengthening of the section at the ends of the link just where, by reason of its constant friction against its neighbors, it is subject to the greatest degree of wear. The life of the chain is thus prolonged, and its trustworthiness is increased by the abolition of the transverse welds above mentioned, while the uniformity in the dimensions of the different links insures a smooth passage of a complete cable through the capstan.

Official trials of a large number of such chains are set out in the table above. For the sake of comparison, the tests prescribed by the great classification societies and by the German admiralty are likewise given. It will be observed that the requirements of these various authorities are not only fulfilled, but sometimes very considerably exceeded. As a result of these tests, chains made by this process have been introduced into the German navy.

ANOTHER STEP IN CLEVELAND BRIDGE AWARD DISPUTE.

A step designed to settle definitely the legality of the award by the commissioners of Cuyahoga county to the King Bridge Co., Cleveland, of the steel superstructure of the proposed Denison-Harvard viaduct, Cleveland, was taken May 21 by the commissioners inducing County Prosecutor Cline to bring a tax-payers' suit against the commissioners' board. The McClintic-Marshall Construction Co. claims the award because of its bid being $1,890 less than the Cleveland company's, but the latter obtained the contract because of specifying that the work shall be completed in 70 days' less time. Organized labor through representatives was largely instrumental in having the tax-payers' suit brought.

In the petition filed by Prosecutor Cline, he assumes the attitude of the McClintic-Marshall company and asks that a restraining order be issued by the court. A hearing will be had later this week on the petition.

QUEBEC BRIDGE

Will be Examined Shortly when Bids May be Asked.

Toronto, Can., May 24.—The plans for the proposed Quebec bridge over the St. Lawrence will shortly be laid before the government, and, if approved, tenders will be called for at an early date. The present piers, which cost $1,500,000, will be utilized for the new bridge, which will have a span almost as large as the 1,800 ft. span of the first bridge; but in place of the single tower, which was the weakness of that structure, the piers will be duplicated on the river side, reducing the central span to 1,600 feet. The cantilever principle will be retained and the material employed will be nickel steel, which is designed to give the bridge superior strength. The height has been fixed at 150 feet above the water at high tide. The cost is estimated at between $6,000,000 and $7,000,000.

At the postponed annual meeting of the Nova Scotia Steel & Coal Co., held at New Glasgow, N. S., May 20, the shareholders ratified plans to issue $6,000,000 5 per cent bonds maturing in 50 years and also $1,000,000 6 per cent debenture stock. The bonds are redeemable at 105. These issues will provide funds to pay off floating liabilities, and furnish $2,000,000 new capital.

The citizens of Barrie, Ont., May 17, voted a loan of $40,000, repayable in 20 years without interest, together with exemption from taxes to the Weber Foundry Co., to enable it to establish a factory for gas producer plants and gas engines. The company must spend $60,000 on the site and plant, and employ 50 men with an annual payroll of not less than $25,000.

The Provincial Steel Works at Cobourg, Ont., formally opened and began active operations May 18, having been completed in about six months from the turning of the first sod. A large concourse was in attendance, among those who took part in the proceedings being H. Field, Mayor of Cobourg; J. D. Hayden, president of Cobourg Board of Trade, and J. B. McColl, M. P.

The American Laundry Machine Mfg. Co. has purchased for $8,000 a factory site in Toronto, with 260 feet frontage and will erect a plant at a cost of $30,000.

In the Cleveland district for March, 63,527 cars were moved, compared with 56,622 cars in March one year ago.

A SYSTEM FOR HANDLING ANALYSES REPORTS[1]

As Used by the Maryland Steel Co.

By J. H. K. Shannahan Jr.[2]

In a manufacturing business, particularly in the iron and steel trades, the analyses of the various raw materials and of the finished products, are of the greatest importance. If the plant be large, a number of the commodities which it purchases, such as paints, oils, coal and coke, ore, etc., all is subject to analysis in order to insure that the buyer is getting exactly the article needed.

In a plant like that of the Maryland Steel Co., at Sparrow's Point, Md., the laboratories are, perhaps, the most important things about the works. Certain it is that without them the plant would not be able to run. All steel rails are made to conform to a certain chemical analysis which is specified by the purchaser and different roads have different specifications. In order to make a steel of a given specification, every step of its manufacture must be carefully watched. The raw materials entering into the iron, such as ore, limestone and coke, must be analyzed; then the iron itself and the steel made from the iron. To go even a step further back, the coal from which the coke is made must also be carefully analyzed in order that the phosphorus limits, which in the making of Bessemer steel is very important, are not exceeded.

Thus it happens that there comes into the main office each day a number of analysis reports, covering a variety of subjects. Obviously, these are very important records, for if a purchaser complains of rails, the manufacturer can trace them back to the raw materials and show that the chemical composition is all right. How best to file and index these reports, so that any one of them may be instantly available, has long been a matter of worry. For the past few years, the reports were put in gum-stub files, using a different book for each subject. This proved to be a snare and a delusion, as in hot weather the stubs would stick together and then the books were not only cumbersome, but if handled very much, frequently became defaced and would break apart.

Another drawback was, while there was an index in the front of each book and the reports as they were

[1]See articles on "Modern Office Practice," by same author. Vol. XLIII, pp. 483, 528, 573, 610, 693, 734, 775.
[2]Sparrow's Point, Md.

MARYLAND STEEL COMPANY.

LABORATORY REPORT, NO......

REPORT OF ANALYSIS OF..... **Sparrow's Point,**.....**190**

	NAME.							
O								
O								

REMARKS:

.....**Chemist,**
Maryland Steel Co.

Fig. 1.

placed therein, were numbered, if an official wished to see the last seven or eight analyses of a given material, it became necessary to carry the heavy book into his office, spread it out on his desk and, with the places of the reports marked by slips of papers, turn over the pages until he had examined them to his satisfaction.

To get away from these objectionable features, a new system has been devised which does away with these old books and gives much better service. To begin with, the form shown in Fig. 1, was devised which does away with over a dozen reports. The blanks at the head of the columns being used for filling in the symbols of the elements whose percentages are shown in the columns below. All reports are written up on a typewriter and it is very little more trouble to write in the symbols at the same time. Heretofore, they were printed in and a large supply had to be maintained of each form for each subject.

These sheets are 9 inches x 10½ inches in size and, it will be observed, are punched on the left side, and on being received in the office are filed in Tengwall files instead of in the old gum files. There is a different file for each subject, as before: one for coal and coke, another for ore, miscellaneous, etc. In the front of each file is an index, and the sheets are put in with the latest one always on the bottom, and numbered consecutively from one on to the end. This assures that if any sheets are removed at any time, the break in the series of numbers will indicate their removal.

A feature about this which will at once suggest itself, is that it is now possible, when an official asks to know how the last shipments of Martinsburg limestone are running, to turn to the index, note that the page numbers are 245, 267, 285, 301, 329 and detaching those particular sheets, lay them on the official's desk, leaving a memo. in the file which is destroyed when the sheets are returned.

The indexing is simple, listing both the party from whom the material is bought and the shipper, or in the case of rails, or other subjects, cross-indexing can be done as readily as with cards.

These files are obtained with a 3½-inch back, so each one will hold about 500 pages. When a file is full, its contents, *with the index*, are taken out and bound together by running a long fastener through the perforations and the whole placed in a transfer box properly labeled: "Coal and Coke, Jan. 3, 1908, to Aug. 6, 1908," or whatever the subject may be. The "miscellaneous" book is the one in which this change is most appreciated, for in it are found those subjects of which there are not enough analyses to warrant each having a book of its own.

All these reports are printed in copying ink and are copied in a tissue copying book before leaving the laboratory, so if by chance, a report should be mislaid, a duplicate is obtainable, and by this means the laboratory is also sure of a record.

According to the old system, there were several sizes of reports, some of which were only half sheets, which required pasting together before being inserted in the gum-stub file. Under the new system, all reports are the same size, with but two excepions, and they are not filed in the Tengwall files, it matters not whether there is but one line on the report; it takes the same size sheet, and what may be lost by seeming extravagance, is gained in uniformity.

INDUSTRIAL EXPOSITION.

Will be Held by Cleveland Manufacturers June 7-19.

The Cleveland Industrial Exposition will be opened at Cleveland, O., June 7, continuing until the 19th. The exposition will be housed in Central armory and in a new building constructed on nearby territory. The armory will furnish 114,000 square feet of floor space for display and the new building 72,000 square feet additional.

The project was suggested to the Chamber of Commerce by a leading Cleveland manufacturer who believed that a wonderfully interesting display could be made of the products of Cleveland manufactories. From the lively responses received to the invitation to participate in it it is certain that the hopes of the projectors will be more than realized. Every sort of manufacture from wire and nails to automobiles and heavy machinery will be shown. Neighboring cities have been invited to participate by setting aside certain days for the especial entertainment of their citizens.

The New York Central lines have definitely placed orders for 71 locomotives with the American Locomotive Co. Nine of the locomotives will be turned out by the Montreal plant, and the others at the Dunkirk and Schenectady plants.

MUCH STRUCTURAL WORK

In and Around San Francisco Has Been Contracted For.

(Special Correspondence).

San Francisco, May 14.—The war department has given out contracts for the construction of an army supply depot, three wharves and sheds to be erected at Fort Mason, military reservation in San Francisco. The depot, wharves and sheds are to receive and house the subsistence stores for Pacific coast army posts and for shipment to the Hawaiian and Philippine Islands. The contract for the 1,500 tons structural steel needed in the construction was awarded to the McClintic-Marshall Construction Co., of Pittsburg. The contract for 1,300 tons of bars for the same buildings was awarded to the Carnegie Steel Co. It will take two years to complete that work, and much more is contemplated, to be started as soon as the work on hand shall be completed.

The city authorities are preparing specifications and will soon invite bids for the construction of a new city and county hospital, which will require about 3,000 tons of structural steel.

At the request of the state harbor commission, Gov. Gillett has ordered the sale of $500,000 worth of harbor bonds, the money to be applied to extending the seawall, build piers and a new ferry depot a short distance from the present depot. The commissioners have already let a contract for one new pier to accommodate the freight traffic. That pier requires 1,300 tons of structural steel, and the contract went to the American Bridge Co. All the new piers are to be built of steel, and the sheds and other super-structures are to be either of sheet iron or covered with metal. There is considerable work in sight on the water front.

Between the work required by the United States government, the state of California, the municipal administration, corporations and individual firms, there is considerable activity in structural iron and steel. The architects report plenty of work on hand and much more in prospect in the very near future, large, medium and moderate jobs, requiring from a few hundred to several thousand tons of iron and steel each.

The National Retail Hardware Dealers' Association will meet in annual convention at Milwaukee May 25 to 27.

NEWS FROM MANY INDUSTRIES

New Buyers:—

The Couple-Gear Co. of New York, New York City, manufacturing electric vehicles, electric and other motors, etc., has been chartered with $50,000 capital stock by these incorporators: William H. Kennard, 2762 Broadway; Fred B. King, 149 Broadway, New York City, and Howard Greene, Cranford, N. J.

The Concrete Steel Construction Co., Elkhart, Ind., with $15,000 capital stock, has been chartered by P. T. Longacher, C. J. Manning and J. J. Hostetter.

The American Safe & Lock Co., Cincinnati, has been incorporated with $25,000 capital stock. Those named in the application are Fred W. Baum, F. W. Goeddel, G. W. Rhein, Catherine Baum and J. A. Rhein.

The Smith Foundry Co., Lexington, O., has filed articles of incorporation, giving its capital stock as $10,000. Those interested are A. F. Smith, Thomas Cureton, H. H. Smith, L. C. Hopkins and E. R. Amend.

Articles of incorporation have been filed by the Refractory Fire Brick Co., Wilmington, Del., with an authorized capital of $350,000. The incorporators include J. L. Cohagan, Washington, Pa., E. L. Squire and G. W. Dorsey Jr., Wilmington, Del.

A charter has been granted to the Fremont Iron Co., Fremont, O., which is capitalized at $10,000 and has these incorporators: V. F. Tobin, F. M. Tunnington, Ora A. Tobias, Edith N. Tunnington.

The Iron Crib & Bin Co., Wooster, O., capitalized at $20,000, has these incorporators: J. S. R. Overholt, J. C. Schulte, A. D. Mowry, J. A. Craig and D. R. Firestone.

The Pritschau Engineering Co., Toledo, O., has been granted a certificate of incorporation, with an authorized capital of $35,000. Ferdinand A. Pritschau, Robinson Bell, W. E. Hanson, Noah Gee and R. B. Wilson are the incorporators.

A certificate of incorporation has been granted to the Frank J. Mann Tool & Appliance Co., the Bronx, New York City, manufacturing tools, hardware, household and shop utilities, with a capital of $10,000. The incorporators are Walter E. Andrews, 1826 Monroe avenue; Frank J. Mann, 2357 Hoffman street, and Stephen Wray, 263 East Tremont avenue.

The Crown Metal Construction Co., Jamestown, N. Y., manufacturing metal furniture, etc., with $75,000 capital stock, has been chartered by David Lincoln, John Wonnberg and Mertin R. Nelson, Jamestown, N. Y., and others.

The Hygrade Iron Works, New York City, capitalized at $10,000, has been incorporated by Ernest Bagge, 719 Prospect avenue, the Bronx; Harry Rasenthol, Hotel Albert, and Eugene Loeb, 67 Riverside drive, New York City.

The Cedarville Wire Fence Co., Dunellen, N. J., has been chartered with $200,000 capital stock. The incorporators are P. W. Hall, Joseph White and Lewis R. Schofield. The company plans to build wire fencing.

Articles of incorporation have been filed by the Reliable Machine Co., Bridgeport, Conn., with an authorized capital of $50,000. The company begins business with $2,600 capital stock, and has these incorporators: Henry J. Taylor, Oscar F. Berg, Susan V. Heley and Travis A. Ganung, all of Bridgeport.

Bernard F. Piel, Inc., of Brooklyn, has been chartered with $10,000 capital stock to deal in engines, boilers, etc., and has these directors: A. M. Piel, G. C. Schneider and P. F. Stein, Brooklyn.

The Pacific Coast Steel Co., with a capital of $1,000,000, has been chartered by the following directors: D. P. Doak, Los Angeles; F. M. Doak, Burlingame; S. C. Denson, San Francisco; L. A. Allyer, Berkeley, and L. Macomber, San Francisco.

A state charter has been granted to the Arandsee Machine Co. of Erie, Pa., with a capital of $12,000. The incorporators are: F. P. Coyle, G. M. Lyle and G. M. Richards, all of Erie.

New Construction:—

The Grand Rapids Stove Co. is erecting a new manufacturing building at Battle Creek, Mich.

The Douglas Foundry & Machine Co., Douglas, Ga., has announced plans for an addition to its plant, 50 x 100 feet.

The Metallic Barrel Co., Toledo, O., is preparing plans for a galvanized iron frame building, 40 x 150 feet.

The Minster Machine Co., Minster, O., is preparing to add a brick pattern shop and office to its plant, 55 x 87 feet.

The Union Steam Pump Co., of Battle Creek, is planning to erect a new office building, and to make a park on the site now occupied by the Saratoga hotel.

The National Cycle Works, Bay City, Mich., has announced that it will double the size of its plant and its working force. The additions will include two new buildings.

The D. J. Murray Mfg. Co., Wausau, Wis., is adding a new structure, two stories, 80 x 140 feet, to its molding department, which will more than double its present facilities.

The Adamson Machine Co., Akron, O., is having plans prepared for a machine shop, 80 x 100 feet, and a blacksmith shop 30 x 67 feet, and power house 40 x 80 feet.

The Donaldson Iron Co. is completing its new foundry at Emaus, Pa., and is equipping it with all modern appliances for the manufacture of iron pipe. The foundry will be put in operation as soon as completed.

The Ruson Foundry & Machine Co. has purchased a tract of land at Alexandria, La., upon which it is proposed to establish a foundry and machine shop with a car wheel foundry department attached as a specialty.

The Illinois Bolt Nut & Forging Co., Thirty-fifth and Ashland avenue, Chicago, is having plans prepared for an addition to its plant. The company is in the market for threading machines and bolt headers.

The Lennox Furnace Co., Marshalltown, Ia., which recently added the manufacture of steel ranges to its other lines, has prepared plans for an addition to the south end of the present foundry, 40 x 50 feet, to cost $1,500.

The Pfannmueller Engineering Co., 164 Dearborn street, Chicago, has awarded the general contract for a machine shop to be erected at Thirty-seventh street and Ashland avenue, Chicago. The shop will be of brick, steel and concrete, two stories, 100 x 405 feet.

The Buckeye Foundry Co., Overpeck Station, Butler county, O., which was recently formed by John May, Oscar Everhardt and Louis P. Hurm, is erecting a foundry which is expected to be ready for business Aug. 1. The company will make a specialty of the manufacture of iron weights of various designs.

The Reading Iron Co. has a large force of men at work remodeling the Emaus furnace and adding some new building, which includes seven automatic filling stock pockets, and it is proposed later to install four new stoves and remove the old ones. The blowing engines are being rebuilt, and two crushers for crushing mill cinder

are being installed. The new stack will be 75 feet high, 10 feet higher than the old one, and will have an output of about 1,300 tons per week, as compared with about 850 tons with the old stack. The estimated cost of the improvements is $50,000, and it is expected that the furnace will be ready for lighting about Nov. 1.

T. M. Smith & Co., machinists, Peoria, Ill., found it necessary to plan for new additions which will include the building of a brick office and show room, with a 30-foot frontage on Washington street, extending back 120 feet. This will also enable the company to equip its shop with new machinery.

The Milwaukee Aluminum & Brass Foundry Co., Milwaukee, Wis., advises that the name adopted in its recent incorporation is simply a change from that of the Milwaukee Aluminum Mfg. Co., which has been enlarged to accommodate increased business. It is the intention of the company to put up a new plant during the summer near its present location.

E. A. Barnes, factory superintendent of the Fort Wayne Electric Works, Fort Wayne, Ind., is visiting various foundry equipment producing cities for the purpose of inspecting foundry machinery to use in equipping the new foundry building of the electric works at Fort Wayne. The new building will soon be in readiness for the machinery, bids for which are being received.

The Bethlehem Foundry & Machine Co., South Bethlehem, Pa., has begun extensive improvements, which will include an addition to the foundry that will double its capacity; the installation of additional core ovens, traveling cranes and other like improvements. When completed the plant will be enabled to handle to better advantage orders for metal working machinery, structural iron work, columns in cast and wrought iron, etc. Manager George Lehman is quoted as saying that the improvements will be completed within 60 days.

The Elgin Tool Works, Elgin, Ill., precision machinery and tools, advises respecting its new plant that it has two lots on North State street on which it will erect a one and two-story building, of brick and concrete, 47 x 113 feet. A 25-horsepower water turbine will be installed to furnish power and light, which the company figures will be ample for the present. The building will be two stories in front, and the balance will be one story, with a saw tooth roof, affording the best light. Construction work was started last week, and the building will be completed before Sept. 1.

General Industrial:—

The Detroit Seamless Steel Tube Co., Detroit, advises respecting the published report that it proposes to erect a new plant at Welland, Ont., that the report was unfounded.

The Central Steel Co., Indianapolis, through its secretary, B. F. Failey, has filed with the secretary of state notice of the decrease of the number of directors from seven to three.

The Brown-Ketchum Iron Works, of Indianapolis, Ind., has filed a certificate with the secretary of state, enabling it to do business in Arkansas. George B. Rose, of Little Rock, is named as the state agent.

The Simmons Mfg. Co., Kenosha, Wis., advises that the loss it recently sustained in a fire at San Francisco was on the stock of goods only, the building not being owned by the Simmons company. The company has leased other quarters.

The Minneapolis Steel & Machinery Co. has been awarded the contract for the proposed steel machinery building for the Minnesota state fair. The building will be 100 x 400 feet, and will be completed by Sept. 1. The contract price is $14,470.

B. H. Fry, Amenia, N. Y., who recently purchased the blast furnace at Chatham, N. Y., at trustee's sale, states that his plans in regard to the property are not settled. Mr. Fry is owner of the Amenia Foundry and is interested in several other manufacturing plants.

Among the orders recently booked by the Crocker-Wheeler Co. is one for two 1,000 KVA, 6,600-volt, three-phase, 25-cycle alternating current generators, for the Nordberg Mfg. Co., Milwaukee. These machines will be used for supplying light and power to the Miami Copper Co., Globe, Ariz.

The B. Helmer Co., Cincinnati, wire goods, advises that the fire damage to its plant recently noted is comparatively light, and will be in the neighborhood of $2,900. The repairs are now under way, and there has been no interruption of business.

J. A. Ripley, F. A. Griswold, both of Yale, Mich., are at Owosso for the purpose of considering the establishment of a plant for the manufacture of corrugated sectional steel, to be made in sections 3 feet long. Mr. Ripley is manager of the Real Estate Exchange.

Stockholders of the Capitol Lock Nut & Washer Co., Columbus, O., which is now in the hands of Receiver Charles Outhwaite, have elected the new board of directors, including A. M. Gaines, E. O. McCullom, C. A. Morris, William Singleton, George K. Black and A. M. Foster, of Cleveland. The board chose Mr. Gaines president, Mr. Black vice president, and Mr. Singleton secretary and treasurer. Since the property of the company will be offered at receivers' sale shortly, it is likely that it will be bid in by local men and the company reorganized.

The land, franchise, etc., at Lancaster, Pa., of the American Swedish Crucible Steel Co., formerly the Standard Iron Mining & Furnace Co., were sold at a receiver's sale recently to the Real Estate Trust Co., of Philadelphia, as trustee for the bondholders for the sum of $100,000. The corporation was bonded at $2,000,000.

The Menominee Machinery Co., Menominee, Wis., has been organized by Sumner and Loren Prescott and James Hamilton to deal in new and second hand machinery. It has purchased the entire equipment of the Marinette Iron Mfg. Co., and will dispose of the machinery, patterns, etc., to various firms requiring equipment.

Bondholders of the Hazleton Steel Co., Hazleton, Pa., whose plant has been idle for some time, have received a proposition from the United Sheet & Tin Plate Co., of Pittsburg, to take over the Hazleton plant under a lease or purchase it with stock. No decision has yet been reached by the Hazleton bondholders.

The Youngstown Sheet & Tube Co., Youngstown, O., has added to its 5,000 horsepower of Crocker-Wheeler motors by installing a 500-horsepower synchronous motor which will operate on a three-phase, 25-cycle circuit at the unusually high potential of 6,000 volts. It will drive a centrifugal pump.

At a recent meeting of Bay City capitalists, preliminary plans were made for the organization of a new company to operate in the old Valley Wind Engine Co., plant, in Saginaw street. It is said a reorganization will be effected. M. Garland, who was connected with the old concern, is one of the movers in the new venture.

The Wisconsin Engine Co. of Corliss, Wis., has just shipped to the Allegheny Valley Street Railway Co. of Pittsburg two horizontal cross compound heavy duty Corliss engines of their "Higher Speed" type. Each engine will develop 750 horsepower and is direct connected to a 500-kilowatt generator operating at 150 revolutions per minute, a speed usually thought to be beyond the limit of the Corliss engine. The Wisconsin Engine Co., however, has made a specialty of what it calls its "Higher Speed" Corliss engines and has built a large number of them, all of which are operating very

successfully. One of the engines above mentioned drives a direct current generator, the other an alternating current generator.

The C. O. Bartlett & Snow Co., Cleveland, recently received the following orders: The Benson Mines Co., Benson Mines, N. Y., one skip hoist; George H. Clippert & Bro. Brick Co., Detroit, one low pressure brick dryer, with a capacity of 30,000 brick per day; Baldwin Bros., Cleveland, one gravel outfit, for disintegrating, elevating, screening and washing gravel.

The Union Steam Pump Co., Battle Creek, Mich., advises that its addition to its machine shop is rapidly nearing completion. It will cost between $25,000 and $30,000. Some new equipment may possibly be added, but that has not been decided upon as yet. The company will continue to manufacture the Burnham and the Moore steam pumps, with the addition of air compressors.

The Hanna Engineering Works, Chicago, has purchased the patents and business of the Rathbone Molding Machine Co., Detroit, Mich., and hereafter will manufacture the multiple type of molding machines at its works. J. A. Rathbone and James T. Lee, formerly with the Rathbone company, are now connected with the Hanna Engineering Works.

Pankow Bros., Sioux Falls, S. Dak., foundrymen and machinists, advise respecting their recent fire that only the pattern shop was destroyed and patterns worth about $3,000 damaged. The building will be repaired and no changes made as to size, nor will any new machinery be purchased. The machine shop was damaged by water, including the destruction of belts and wooden pulleys. Insurance on patterns only partially covers the loss.

The St. Francis Iron & Land Co., whose incorporation was recently noted, has organized by the election of these officers: President, James W. Van Dolan; vice president, James A. Plotner; secretary-treasurer, C. P. Scroggin. The company will develop several thousand acres of iron ore and timber land in Wayne county, Mo.

The Van Buren Tool Co., Van Buren, Ind., whose incorporation was recently noted, has organized by the election of these officers and directors: President and manager, E. L. Coddington; vice president and treasurer, Alonzo Coddington; secretary, Mrs. R. A. Redding; Albert Coddington, Ross Coddington and Frank Coddington. The machinery equipment for the manufacture of small tools and hardware specialties, on which E. L. Coddington holds a number of patents, is now in place, and the plant will be running shortly.

The Diamond Iron Works, Hammond, La., was recently organized, the principal stockholders including F. B. Coyne, George E. Boos, George F. Smith and A. L. Way, the latter two of whom, being practical machinists, will direct the shops. The Hammond machine shop, formerly operated by Mr. Way, has been taken over by the new company, and a gray iron foundry will be added at once. It is also the intention of the company to establish in connection therewith a small brass foundry.

The Miami Valley Machine Tool Co., manufacturer of lathes and sensitive drills, and the Dayton Machine & Tool Works, manufacturer of grinding machines for tool room and manufacturing, both of Dayton, O., have consolidated their business and will adopt the name of the former company. David Wilson, who has been sole owner of the Dayton Machine & Tool Works, and who has had long experience in the building of machine tools and special machinery, will be actively connected with the new company, and will continue giving his personal attention to the building of the Dayton grinders, as well as the Miami Valley lathes and sensitive drills. The consolidation simply means the enlarging of two already grown concerns, and they will continue the lines each has already started and will, no doubt, add to them as the business increases.

Trade Notes:—

The issuance of the fortnightly bulletins by the Walter A. Zelnicker Supply Co., Zelnicker building, St. Louis, containing complete lists of offerings from rails and track material to locomotives, has become a feature which is recognized generally by the trade.

The Darley Engineering Co., builder of patented suction conveyors, announces that effective May 12 its Pittsburg offices were abolished, the engineering, purchasing and sales departments having been transferred to the New York office, the Singer building (tower), 149 Broadway. The Chicago office will remain in the Monadnock building. The new officers of the company are: President and general manager, W. A. Stadelman; vice presidents, C. L. Inslee and W. G. Hudson; treasurer, W. W. Ricker; secretary, M. D. Chapman.

Fires:—

The James Robertson & Co.'s plumbers' supply plant at Montreal was recently damaged to the extent of about $235,000. The insurance reached $214,000.

The six-story brick factory building at 317-319 Milwaukee street, Milwaukee, Wis., was damaged by fire May 24, when losses were sustained by the Milwaukee Cutting Die Co., of $1,000, and the Seaman Machine Co., a loss of $500.

The roof of the Ottumwa Iron Works, Ottumwa, Ia., caught fire May 20, and caused damage to the plant which is estimated at $2,000.

The building of the Reid Foundry & Machinery Co., Ingersoll, Ont., was badly damaged May 19, the loss being estimated at about $10,000, with $8,000 insurance.

TRADE PUBLICATIONS.

VARIABLE SPEED TRANSMISSION.—The Reeves Pulley Co., Columbus, Ind., is distributing an engineers' manual, which, besides being descriptive of the Reeves Variable Transmission and giving details of construction, dimensions of various sizes, and particulars of speeds, powers, etc., contains a large amount of miscellaneous information valuable to superintendents and operating engineers. The manual is interleaved with section-lined paper, ruled 6 per inch each way, making it very convenient for sketches and memoranda, and contains altogether about 120 pages 3 x 6 inches. For the manual bound in heavy red leather a charge of $1 is made; or to reputable engineers and manufacturers, the same book bound in heavy paper will be sent free upon application to the Reeves Pulley Co.

GRAPHITE PRODUCTS—What might be called a pocket edition general catalog has just been gotten out by the Joseph Dixon Crucible Co. of Jersey City, N. J. This lists their principal products, such as crucibles, facings, lubricating graphite, greases, pencils, protective paint, etc., giving brief descriptions and prices. It is of value to the purchasing agent, engineer, contractor, superintendent, and anyone, in fact, who uses or specifies graphite in any form. The booklet is of commercial envelope size, and will conveniently go in the pocket or desk pigeonhole. It is substantially bound in tough cover stock, and attractively printed.

CONDENSING APPARATUS.—The A. S. Cameron Steam Pump Works, New York, in an 8 page, 6 x 9 inch catalog, describes its new line of condensing apparatus, which now covers jet and surface condensers for high vacuum work.

GRINDING AND POLISHING MACHINERY.—The Webster & Perks Tool Co., Springfield, O., has issued a new catalog describing its line of grinding and polishing machines, including bench and floor grinders, end grinders, plate edge grinders, and buffing and polishing lathes. 16 pages, 6 x 9 inches.

MACHINERY SUPPLIES.—The Lake Erie Nail & Supply Co., Cleveland, O., has just issued a 407-page, 6 x 9-inch catalog, describing a full line of mill machinery and tool supplies. The line appears to be very complete and the catalog is well gotten up.

ELECTRIC HOISTS.—The Shepard Electric Crane & Hoist Co., 50 Church street, New York, in Builetin No. 502, briefly describes a line of electric cranes and stationary and portable hoists, adaptable to a wide range of service.

Highest Prices in Two Years.

The New York stock market during May, just closed, recorded the highest average prices for a longer period than two years. Railroad shares reached this high level the first half of the month, while industrials did not arrive there until last week. Still, the general tendency of the market last week was toward uncertainty.

Monday's opening was strong but later a decline set in and dullness resulted; in Chicago, wheat advanced to another high price; the Steel Corporation sold $9,000,000 Chicago-Gary railroad 4½ per cent bonds; New York City authorities gave notice of intention to sell $40,000,000 4 per cent bonds for municipal improvements. Tuesday the market was dull, with the exceptions of Steel common and Amalgamated Copper; grain markets were excited and active; all grades of copper metal advanced. Wednesday's figures showed declines generally, the market being featureless; all grades of copper metal again advanced. The market was dull but steady Thursday, Steel common advancing to the highest price ever quoted and Republic preferred to the highest price of the year; in Pittsburg, Crucible Steel preferred went to the highest price in two years; Lake Superior Corporation shares showed declines for the first time since the long advance began following acquisition by the Fleming interests. Steel common, which was easily the feature of the week, advanced Friday to 64⅜, the highest ever quoted, and making a net gain for the day of 3⅛; the rest of the list was dull and listless, the grain markets being irregular and cotton closing lower; copper metal was firmer and advanced ⅛ cent; Crucible Steel advanced to 69½, again the highest in two years. Saturday all stock exchanges throughout the country as well as abroad were closed and remained closed Monday of this week.

Money continued easy throughout the week, call loans ruling between 1½ and 2 per cent, averaging 1¾. Time money was somewhat easier. Foreign exchange rate, after an engagement of $300,000 for South America, moved to below the export point. The weekly statement of New York banks showed a gain in surplus reserve of $5,065,450, which brings the total surplus to $24,985,225, as compared with $52,874,375 the corresponding week last year. Money continued to flow into New York from interior points. The actual figures of clearing house banks showed loans increased $197,300; deposits increased $5,848,000; and the ratio of reserve, 26.9, an increase of 0.3 per cent; non-member banks and trust companies showed loans increased $8,543,500; net deposits increased $13,547,600; and the ratio of reserve, 18.8, unchanged. Bank clearings made a decline in totals compared with the preceding week of 9 per cent but showed an increase of 31 per cent compared with a year ago. Commercial failures for the week were 205 as against 219 for the preceding week. Shares were sold to the number of 2,612,640, compared with 3,004,600 the preceding week and 3,574,650 the corresponding week last year. Bonds, exclusive of government bonds, were sold to the amount of $20,076,000, compared with $20,626,000 the preceding week and $12,948,000 the corresponding week last year.

THE LEADING INDUSTRIAL SECURITIES.

	Closing Quo. May 28	Changes in Week	Date Ann.	1909 M't'g.	Stock Outstanding	Dividend Basis	Dividend Last Declared	Dividend Date Last Div. Pay.
Allis-Chalmers	16	— ¼	Sept.	2	$19,820,000		.....	.....
Allis-Chalmers, pr	52¼	+ ⅞			16,150,000	7 cum	1¾ Q.	Feb., 1904
American Can	12⅞	— ¼	Feb.	2	41,233,300		.....	.....
American Can, pr	82	.....			41,233,300	7 cum	1¼ Q.	Jan., 1909
Am. Car & Foundry	56½	+1½	June	24	30,000,000		½ Q.	Jan., 1909
Am. Car.& Fdy., pr	116¾	+ ⅝			30,000,000	7 n. c.	1¾ Q.	Jan., 1909
American Loc	58⅛	+ ¾	Oct.	19	25,000,000	5	1¼ Q.	Aug., 1908
American Loc., pr	115	.....			25,000,000	7 cum	1¾ Q.	April, 1909
American Ship	60	.....	Oct.	13	7,600,000	4	1 Q.	June, 1908
American Ship, pr	107¾	— ¼			7,900,000	7 n. c.	1¾ Q.	Oct., 1908
Am. Steel Foundries(new)	41¼	+1¾	Dec.	2	17,184,000		.....	.....
Am. Steel Foundries, pr	47½	.....			17,240,000	6 cum	1	Aug., 1904
Barney & Smith	30	.....	June	1	2,000,000	4	1 Q.	Sept., 1907
Barney & Smith, pr	95	.....			2,500,000	8 cum	2 Q.	June, 1908
Bethlehem Steel	29½	+ ¼	April	6	14,862,000		.....	.....
Bethlehem Steel, pr	61¼	+2¼			14,908,000	7 n. c.	¾ Q.	Feb., 1907
Cambria Steel	40	+1	March	16	45,000,000*	3	1½ S. A.	Feb., 1909
Cambria Iron	46¼	+ ⅛			8,468,000*	4	2 S. A.	Sept., 1908
Chicago Pneumatic Tool	24½	+ ¼	Feb.	15	6,145,800	4	1 Q.	Oct., 1907
Colorado Fuel	41½	+ ¼	Oct.	18	34,235,500		3½	April, 1902
Crucible Steel	87⅝	— ⅛	Oct.	20	24,578,400		.....	.....
Crucible Steel, pr	69¼	+1½			24,436,500	7 cum	1 Q.	Mar., 1909
Empire Steel	9	+3	April	27	1,254,770		.....	.....
Empire Steel, pr	52	+1			2,500,000	6 cum	1½ S. A.	Jan., 1909
Fay & Egan	90	.....	Feb.	18	1,000,000	7	1¾ Q.	Nov., 1908
Fay & Egan,pr	125	.....			1,000,000	7 cum	1½ Q.	May, 1909
General Electric	160¾	+ ¼	May	11	65,178,800	8	2 Q.	Jan., 1909
Harbison-Walker	17	.....	Jan.	18	18,000,000		½	Oct., 1907
Harbison-Walker, pr	83	—2			9,600,000	6 cum	1½ Q.	April, 1909
International Pump	40⅞	+ ⅜	June	8	17,762,500		1	April, 1905
International Pump, pr	87	— ¾			11,350,000	6 cum	1½ Q.	May, 1909
Lackawanna Steel	43	.....	March	10	34,971,400		.....	.....
Lake Sup. Corp	27¼	—4	Oct.	6	40,000,000		.....	.....
New York Air Brake	88¾	.....	June	17	8,012,500	8	2 Q.	Oct., 1907
Niles-Bement-Pond	100	.....	Feb.	3	8,500,000	3	1½ Q.	June, 1909
Niles-Bement-Pond, pr	100	.....			2,000,000	6 cum	1½ Q.	May, 1909
Otis Elevator Co	55	.....	March	15	6,375,300		1½ S. A.	April, 1909
Otis Elevator Co., pr	97	.....			6,295,000	3 n. c.	1½ Q.	April, 1909
Penn Steel	50	.....	May	10	10,750,000		.....	.....
Penn. Steel, pr	105¼	+ ¼			16,500,000	7 n. c.	3½ S. A.	May, 1909
Pittsburg Coal Co	12¾	+1¼	March	9	28,104,600		.....	Nov., 1906
Pittsburg Coal Co., pr	49¼	+1¾			27,071,800	7 c.	1¾	April, 1905
Pressed Steel Car	43⅛	+1⅛	Feb.	17	12,500,000		3	Aug., 1904
Pressed Steel Car, pr	103¾	+ ¾			12,500,000	7 n. c.	1¾ Q.	May, 1909
Pullman	189	—2⅛	Nov.	10	100,000,000	8	2 Q.	May, 1909
Railway Stl. Spring	44⅛	+1⅛	March	4	13,500,000	2	1 S. A.	Oct., 1908
Railway Stl. Spring, pr	106	.....			13,500,000	7 cum	1¾ Q.	Dec., 1908
Rep. Iron & Steel	29¾	+1	Oct.	20	27,191,000		.....	.....
Rep. Iron & Steel, pr	96	+5			20,416,900	7 cum	1¾ Q.	April, 1908
Sloss-Sheffield	83¾	+ ¾	March	10	10,000,000	5	1¼ Q.	June, 1909
Sloss-Sheffield, pr	115	+2			6,700,000	7 n. c.	1¾ Q.	April, 1909
U. S. Pipe & Fdy	33¼	— ½	June	23	12,500,000	2	½ Q.	Dec., 1907
U. S. Pipe & Fdy, pr	78	.....			12,500,000	7 n. c.	1¾ Q.	Sept., 1908
U. S. Steel	64⅜	+4⅛	April	19	508,302,500	2 n. c.	½ Q.	June, 1909
U. S. Steel, pr	120	.....			360,281,100	7 cum	1¾ Q.	June, 1909
U. S. Steel, 5s	105½	+ ⅜			463,798,000	5	5 A.	.....
Va. Iron, Coal & Coke	65	+2	Sept.	21	9,073,680		.....	.....
Westinghouse Elec	83¾	— ¼	June	16	27,173,200	10	2½ Q.	April, 1909
Westinghouse Air Brake	110	.....	Oct.	5	14,000,000*		2½ Q.	Oct., 1907

Par value of shares, $100, except those starred (*), $50.

Copper Stocks.

New York.—Amalgamated Copper closed at 85¼, a net gain of 1⅛.

Boston.—Butte Coalition closed 26⅞, a net gain of ⅞; Calumet & Arizona closed 103½, a net gain of ¾; Calumet & Hecla closed 660, a net gain of 20; North Butte Mining closed 58⅛, a net gain of 2; Quincy Mining closed 90, a net loss of 2.

Financial Notes.

The American Car & Foundry Co. declared the regular quarterly dividends of 1¾ per cent on preferred and ½ of 1 per cent on common, payable July 1; the York Mfg. Co., the regular semi-annual dividend of 3 per cent, payable June 1; the National Enameling & Stamping Co., the regular quarterly dividend of 1¾ per cent on preferred, payable June 30.

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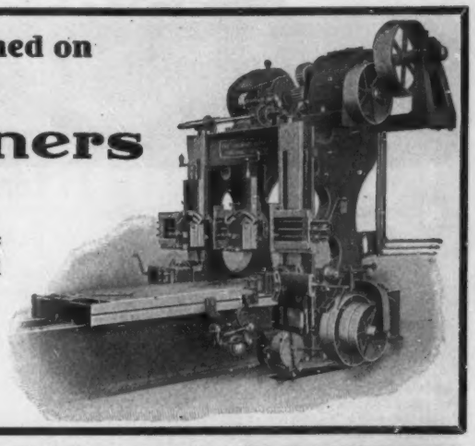

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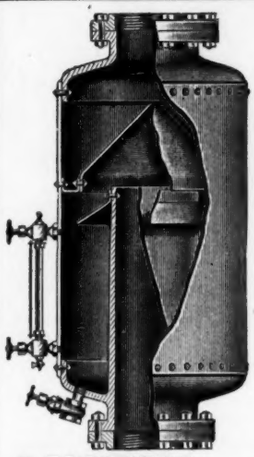

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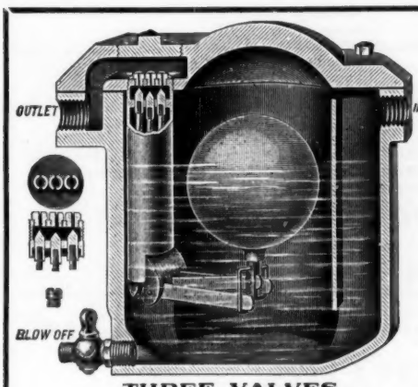

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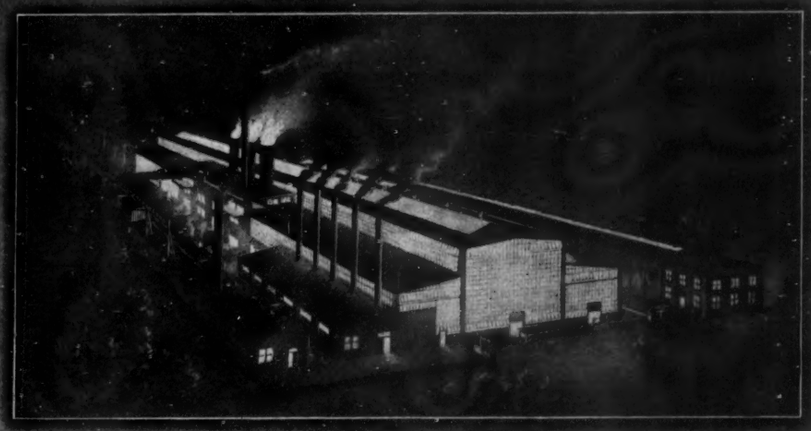

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Bassett-Presley Co., Cleveland, O.
Bourne-Fuller Co., Cleveland, O.
Buffalo Steel Co., Tonawanda, N. Y.
Carnegie Steel Co., Pittsburg, Pa.
Globe Rolling Mill Co., Cincinnati, O.
Inland Steel Co., Chicago, Ill.
Interstate Iron & Steel Co., Chicago, Ill.
Jones & Laughlin Steel Co., Pittsburg, Pa.
Kratzer, W. N., & Co., Pittsburg, Pa.
Lackawanna Steel Co., New York City.
Lockhart Iron & Steel Co., Pittsburg, Pa.
North Works, Chicago, Ill.
Republic Iron & Steel Co., Pittsburg, Pa.
Ryerson & Son, Joseph T., Chicago, Ill.
Scully Iron & Steel Co., Chicago, Ill.
Standard Gauge Steel Co., Beaver Falls, Pa.
Tennessee Coal, Iron & Railroad Co., Birmingham, Ala.

ANTI-VIBRATORS.
Ruddiman, John, New York, N. Y.

APPLIANCES (Steel Works).
Blair Engineering Co., New York, N. Y.

ARCHES (Boiler Door and Combustion Chamber).
McLeod & Henry Co., Troy, N. Y.

ARMATURES.
General Electric Co., Schenectady, N. Y.
Westinghouse Elec. & Mfg. Co., Pittsburg, Pa.

ASSAYERS.
Emmerton, F. A., Cleveland, O.
Peck, Francis J., & Co., Cleveland, O.

AXLES.
Carnegie Steel Co., Pittsburg, Pa.
Consolidated Mfg. Co., Toledo, O.
Cleveland City Forge & Iron Co., Cleveland, O.
Lockhart Iron & Steel Co., Pittsburg, Pa.
Otis Steel Co., Ltd., Cleveland, O.

AXLES (Automobile).
Consolidated Mfg. Co., Toledo, O.

BAKERS (Wire Coating, Wire, Rivet and Bolt Works).
Turner, Vaughn & Taylor Co., Cuyahoga Falls, O.

BALLS (Steel).
Auburn Ball Bearing Co., Rochester, N. Y.
Wyman & Gordon, Worcester, Mass.

BANDS.
Bassett-Presley Co., Cleveland, O.
Carnegie Steel Co., Pittsburg, Pa.
Globe Rolling Mill Co., Cincinnati, O.
Jones & Laughlin Steel Co., Pittsburg, Pa.
Pittsburg Steel Co., Pittsburg, Pa.

BARRELS (Tumbling, Welded Chain and Wire Nail Mills).
Northern Engineering Works, Detroit, Mich.
Obermayer, S., Co., Cincinnati, O.
Smith, J. D., Fdry. Supply Co., Cleveland, O.
Turner, Vaughn & Taylor Co., Cuyahoga Falls, O.
Whiting Fdy. Equipment Co., Harvey, Ill.

BARROWS.
American Fork & Hoe Co., Cleveland, O.
Meehan Boiler & Cons. Co., Lowellville, O.
Obermayer, S., Co., Cincinnati, O.
Smith, J. D., Fdry. Supply Co., Cleveland, O.
Wiener Co., Ernst, New York, N. Y.
Youngstown Car Mfg. Co., Youngstown, O.

BARS (Concrete Reinforcing).
American Sheet & Tin Plate Co., Pittsburg, Pa.
American Steel & Wire Co., Chicago, Ill.
Bassett-Presley Co., Cleveland, O.
Buffalo Steel Co., Tonawanda, N. Y.
Inland Steel Co., Chicago, Ill.
Interstate Iron & Steel Co., Chicago, Ill.
North Works, Chicago, Ill.
Ryerson, Joseph T., & Son, Chicago, Ill.

BARS (Iron and Steel).
American Bridge Co., New York City.
American Iron & Steel Mfg. Co., Lebanon, Pa.
Bassett-Presley Co., Cleveland, O.
Bourne-Fuller Co., Cleveland, O.
Buffalo Steel Co., Tonawanda, N. Y.
Carnegie Steel Co., Pittsburg, Pa.
Globe Rolling Mill Co., Cincinnati, O.
Harvey, Arthur C., Boston, Mass.
Highland Iron & Steel Co., Terre Haute, Ind.

GRAY IRON CASTINGS

The Marshall Foundry Co.

Twenty-Eighth and Railroad Sts.,

PITTSBURGH, PA.

Manufacturers of

Ingot Molds and Iron Castings

OF ALL DESCRIPTIONS

Capacity

250 TONS PER DAY

CASTINGS

Iron and Semi-Steel

HEAVY MACHINERY CASTINGS
Up to 25 tons in weight
SEMI-STEEL CASTINGS guaranteed
over 30,000 lbs. tensile strength
SMALLER CASTINGS made on molding
machines at low prices

BIRMINGHAM IRON FOUNDRY
Derby, Conn.

ROSS-MEEHAN FOUNDRY CO.
Chattanooga, Tenn.

Grey & Malleable
Iron Founders

CASTINGS

1 ounce to 50,000 pounds

Railroad & Warehouse Stoves.
A full line of M. C. B. Standard Patterns.

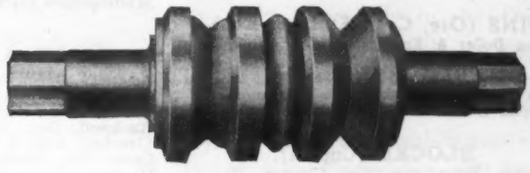
ROLLS Sand and Chilled

CASTINGS

Rolling Mill Machinery

Hyde Park Foundry & Machine Co.,
Hyde Park (West Penn. Div. P. R. R.), Pa.

ROLLING MILL MACHINERY
and
AIR FURNACE CASTINGS



14" x 27" Chill Pass Angle Roll

AMERICAN ROLL & FOUNDRY CO.
Canton, Ohio

BARS (Iron and Steel)—Continued.

Inland Steel Co., Chicago, Ill.
Interstate Iron & Steel Co., Chicago, Ill.
Jones & Laughlin Steel Co., Pittsburg, Pa.
Kratzer, W. N., & Co., Pittsburg, Pa.
LaBelle Iron Works, Steubenville, O.
Lackawanna Steel Co., New York City.
Lockhart Iron & Steel Co., Pittsburg, Pa.
Milton Mfg. Co., Milton, Pa.
North Works, Chicago, Ill.
Republic Iron & Steel Co., Pittsburg, Pa.
Ryerson, Jos. T., & Son, Chicago, Ill.
Scully Steel & Iron Co., Chicago, Ill.
Standard Gauge Steel Co., Beaver Falls, Pa.
Tennessee Coal, Iron & Railroad Co., Birmingham, Ala.

BARS (Sheet).

Carnegie Steel Co., Pittsburg, Pa.
Lackawanna Steel Co., New York City.
LaBelle Iron Works, Steubenville, O.
Mudge, Edmund W., & Co., Pittsburg, Pa.
Republic Iron & Steel Co., Pittsburg, Pa.
Tennessee Coal, Iron & Railroad Co., Pittsburg, Pa.
United Steel Co., Canton, O.
Youngstown Sheet & Tube Co., Youngstown, O.

BARS (Splice).

Carnegie Steel Co., Pittsburg, Pa.
Central Track Supply Co., Springfield, O.
Lackawanna Steel Co., New York City.

BATTERIES (Storage).

Westinghouse Machine Co., E. Pittsburg, Pa.

BEARINGS.

Auburn Ball Bearing Co., Rochester, N. Y.
Enterprise Metal Co., Syracuse, N. Y.
Jones & Laughlin Steel Co., Pittsburg, Pa.
Phosphor Bronze Smelting Co., Philadelphia, Pa.
Ryerson, Jos. T., & Son, Chicago, Ill.
Schultz, A. L., & Son, Chicago, Ill.

BEDS (Cooling).

Morgan Construction Co., Worcester, Mass.

BELLOWS (Foundry).

Obermayer, S., Co., Cincinnati, O.
Smith, J. D., Fdry. Supply Co., Cleveland, O.

BELTING.

Chicago Rawhide Mfg. Co., Chicago, Ill.

BELTING (Link).

Dodge Mfg Co., Mishawaka, Ind.
Jeffrey Mfg. Co., Columbus, O.
Port Huron Engine & Thresher Co., Port Huron, Mich.

BELTS (Conveying).

Jeffrey Mfg. Co., Columbus, O.

BENCHES (Draw, Wire, Rivet and Bolt Works).

Morgan Construction Co., Worcester, Mass.
Turner, Vaughn & Taylor Co., Cuyahoga Falls, O.
Waterbury Farrel Foundry & Machine Co., Waterbury, Conn.

BILLETS.

American Steel & Wire Co., Chicago, Ill.
Bassett, Presley Co., Cleveland, O.
Carnegie Steel Co., Pittsburg, Pa.
Inland Steel Co., Chicago, Ill.
Jones & Laughlin Steel Co., Pittsburg, Pa.
LaBelle Iron Works, Steubenville, O.
Lackawanna Steel Co., New York City.
North Works, Chicago, Ill.
Otis Steel Co, Cleveland, O.
Republic Iron & Steel Co., Pittsburg, Pa.
Stewart Iron Co., Ltd., Cleveland, O.
Taylor, N. & G., Co., Philadelphia, Pa.
Tennessee Coal, Iron & Railroad Co., Pittsburg, Pa.
United Steel Co., Canton, O.
Wood, Alan, Iron & Steel Co., Philadelphia, Pa.

BINS (Ore, Coal, Storage, Etc.).

Canton Boiler & Engineering Co., Canton, O.

BLOCKS (Chain).

Byers, John F., Machine Co., Ravenna, O.
Chisholm & Moore Mfg. Co., Cleveland, O.

BLOCKS (Cupola).

American Refractories Co., Chicago, Ill.
Harbison-Walker Refractories Co., Pittsburg, Pa.
Obermayer, S., Co., Cincinnati, O.
Smith, J. D., Fdry. Supply Co. Cleveland, O.
Stevens, F. B., Detroit, Mich.
Stowe-Fuller Co., Cleveland, O.

BLOOMS.

Carnegie Steel Co., Pittsburg, Pa.
Hillman, J. H., & Son, Pittsburg, Pa.
Inland Steel Co., Chicago, Ill.
Jones & Laughlin Steel Co., Chicago, Ill.
LaBelle Iron Works, Steubenville, O.
Lackawanna Steel Co., New York City.
National Tube Co., Pittsburg, Pa.
Tennessee Coal, Iron & Railroad Co., Pittsburg, Pa.
Wood, Alan, Iron & Steel Co., Philadelphia.

BLOWERS.

Cameron, A. S., Steam Pump Works, New York City.
Eynon-Evans Mfg. Co., Philadelphia, Pa.
General Electric Co., Schenectady, N. Y.
Green Fuel Economizer Co., Matteawan, N. Y.
Smith, J. D., Fdry, Supply Co., Cleveland, O.

BOILERS.

Baird Machinery Co., Pittsburg, Pa.
Canton Boiler & Engrg. Co., Canton, O.
Chicago House Wrecking Co., Chicago, Ill.
Cooper, C. & G., Co., Mt. Vernon, O.
Farrar & Trefts, Buffalo, N. Y.
Hathaway, A. G., & Co., Cleveland, O.
Industrial Works, Bay City, Mich.
Lake Erie Engine Works, Buffalo, N. Y.
Meehan Boiler & Construction Co., Lowellville, O.
Petroleum Iron Works Co., Sharon, Pa.
Phoenix Iron Works Co., Meadville, Pa.
Randle Machinery Co., Cincinnati, O.
Riter-Conley Mfg. Co., Pittsburg, Pa.
Schultz, A. L., & Son, Chicago, Ill.
Sharon Boiler Works, Sharon, Pa.
Standard Boiler & Plate Iron Co., Niles, O.
Struthers-Wells Co., Warren, Pa.
Toomey, Frank, Philadelphia, Pa.
Vandyck-Churchill Co., New York City.
Wickes Bros., Pittsburg, Pa.

BOLTS.

American Bridge Co., New York City.
Bassett-Presley Co., Cleveland, O.
Chicago Screw Co., Chicago, Ill.
Graham Nut Co., Pittsburg, Pa.
Jones & Laughlin Steel Co., Pittsburg, Pa.
Milton Mfg. Co., Milton, Pa.
National Bolt & Nut Co., Pittsburg, Pa.
Oliver Iron & Steel Co., Pittsburg, Pa.
Republic Iron & Steel Co., Pittsburg, Pa.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.
Ryerson, Joseph T., & Son, Chicago, Ill.
Steel Car Forge Co., Pittsburg, Pa.
Upson Nut Co., Cleveland, O.

BOOKS.

Penton Publishing Co., Cleveland, O.

BOXES (Annealing).

Canton Boiler & Engrg. Co., Canton, O.
Meehan Boiler & Construction Co., Lowellville, O.
Union Steel Casting Co., Pittsburg, Pa.
United Engineering & Fdy. Co., Pittsburg, Pa.
Wilfong Bros., Philadelphia, Pa.

BOXES (Charging).

Meehan Boiler & Construction Co., Lowellville, O.
Morgan Engineering Co., Alliance, O.
Variety Iron & Steel Works Co., Cleveland, O.

BRACES (Rail).

Central Track Supply Co., Springfield.

BRAZING (Custom).

Champion Engineering Co., Cleveland, O.

BREAKERS (Casting).

Curtis & Co. Mfg. Co., St. Louis, Mo.
Whiting Foundry Equipment Co., Harvey, Ill.

BREAKERS (Circuit).

General Electric Co., Schenectady, N. Y.
Westinghouse Electric & Mfg. Co., Pittsburg, Pa.

BRICK AND CLAY (Fire).

American Refractories Co., Chicago, Ill.
Ashland Fire Brick Co., Ashland, Ky.
Bickford Fire Brick Co., Pittsburg, Pa.
Blackwell, Geo. G., Sons & Co., Liverpool.
Clearfield Fire Brick Co., Clearfield, Pa.
Dover Fire Brick Co., Cleveland, O.
Harbison-Walker Refractories Co., Pittsburg, Pa.
Kenworthy Engineering Co., Waterbury, Conn.
Niles Fire Brick Co., Niles, O.
Robertson, Wm., & Son, New Brighton, Pa.
Scioto Fire Brick Co., Sciotoville, O.
Stowe-Fuller Co., Cleveland, O.
Smith, J. D., Fdry. Supply Co., Cleveland, O.
Soisson, Jos., Fire Brick Co., Connellsville, Pa.
Stevens, F. B., Detroit, Mich.
Swank's Sons, Hiram, Johnstown, Pa.

BRICK (Silica, Magnesia, Chrome).

American Refractories Co., Chicago, Ill.
Harbison-Walker Refractories Co., Pittsburg, Pa.
Soisson, Jos., Fire Brick Co., Connellsville, Pa.
Stowe-Fuller Co., Cleveland, O.

BRIDGES AND VIADUCTS (Steel).

American Bridge Co., New York City.
Bellefontaine Bridge & Steel Co., Bellefontaine, O.
Interstate Engineering Co., Cleveland, O.
McClintic-Marshall Construction Co., Pittsburg, Pa.

BRUSHES (Foundry).

Obermayer, S., Co., Cincinnati, O.
Smith, J. D., Fdry. Supply Co., Cleveland, O.

BUCKETS (Clam Shell).

Interstate Engineering Co., Bedford, O.
Macbeth Iron Co., Cleveland, O.
McMyler Mfg. Co., Cleveland, O.
Wellman-Seaver-Morgan Co., Cleveland, O.

BUCKETS (Elevator and Hoisting).

Bartlett, C. O., & Snow Co., Cleveland, O.
Brown Hoisting Machinery Co., Cleveland, O.
Jeffrey Mfg. Co., Columbus, O.
McMyler Mfg. Co., Cleveland, O.
Wellman-Seaver-Morgan Co., Cleveland, O.

BULLDOZERS.

Cleveland Punch & Shear Works Co., Cleveland, O.
Long & Allstatter Co., Hamilton, O.
National Machinery Co., Tiffin, O.

BULLDOZERS (Hydraulic).

Chambersburg Engineering Co., Chambersburg, Pa.

BURNERS (Fuel Oil).

Burns Oil-Fuel Furnace Co., Fort Plain, N. Y.
Petroleum Iron Works Co., Sharon, Pa.
Rockwell Furnace Co., New York, N. Y.

BURRS (Rivet).

Wrought Washer Mfg. Co., Milwaukee, Wis.

CABLEWAYS.

McClintic-Marshall Construction Co., Pittsburg, Pa.

CARS (Annealing, Pig Iron, Etc).

Chase Foundry & Mfg. Co., Columbus, O.
Smith, J. D., Fdry, Supply Co.. Cleveland, O.
Whiting Foundry Equipment Co., Harvey, Ill.
Youngstown Car Mfg. Co., Youngstown, O.

CARS (Billet).

Atlas Car & Mfg. Co., Cleveland, O.
Chase Foundry & Mfg. Co., Columbus, O.
Watt Mining Car Wheel Co., Barnesville, O.
Youngstown Car Mfg. Co., Youngstown, O.

CARS (Charging).

Atlas Car & Mfg. Co., Cleveland, O.
Chase Foundry & Mfg. Co., Columbus, O.
Variety Iron & Steel Works Co., Cleveland, O.
Youngstown Car Mfg. Co., Youngstown. O.

CARS (Coal, Coke and Mining).

Jeffrey Mfg. Co., Columbus. O.
Massillon Fdry. & Machine Co., Massillon, O.
Watt Mining Car Wheel Co., Barnesville, O.
Wiener Co., Ernst, New York, N. Y.
Youngstown Car Mfg. Co., Youngstown, O.

CARS (Derrick).

Byers, John F., Machine Co., Ravenna, O.
Watt Mining Car Wheel Co., Barnesville, O.

CARS (Electrically Driven).

Atlas Car & Mfg. Co., Cleveland, O.
Jeffrey Mfg. Co., Columbus, O.
Westinghouse Machine Co., E. Pittsburg, Pa.

CARS (Industrial).

Atlas Car & Mfg. Co., Cleveland, O.
Chase Foundry & Mfg. Co., Columbus, O.
Watt Mining Car Wheel Co., Barnesville, O.
Wiener Co., Ernst, New York, N. Y.
Whiting Foundry Equipment Co., Harvey, Ill.
Youngstown Car Mfg. Co., Youngstown, O.